RAD
data communications

Installation and Operation Manual

RIC-E1

E1 Interface Converter

RIC-E1

E1 Interface Converter
Installation and Operation Manual

Notice

This manual contains information that is proprietary to RAD Data Communications Ltd. ("RAD"). No part of this publication may be reproduced in any form whatsoever without prior written approval by RAD Data Communications.

Right, title and interest, all information, copyrights, patents, know-how, trade secrets and other intellectual property or other proprietary rights relating to this manual and to the RIC-E1 and any software components contained therein are proprietary products of RAD protected under international copyright law and shall be and remain solely with RAD.

RIC-E1 is a registered trademark of RAD. No right, license, or interest to such trademark is granted hereunder, and you agree that no such right, license, or interest shall be asserted by you with respect to such trademark.

You shall not copy, reverse compile or reverse assemble all or any portion of the Manual or the RIC-E1. You are prohibited from, and shall not, directly or indirectly, develop, market, distribute, license, or sell any product that supports substantially similar functionality as the RIC-E1, based on or derived in any way from the RIC-E1. Your undertaking in this paragraph shall survive the termination of this Agreement.

This Agreement is effective upon your opening of the RIC-E1 package and shall continue until terminated. RAD may terminate this Agreement upon the breach by you of any term hereof. Upon such termination by RAD, you agree to return to RAD the RIC-E1 and all copies and portions thereof.

For further information contact RAD at the address below or contact your local distributor.

International Headquarters
RAD Data Communications Ltd.

24 Raoul Wallenberg St.
Tel Aviv 69719 Israel
Tel: 972-3-6458181
Fax: 972-3-6498250
E-mail: market@rad.com

U.S. Headquarters
RAD Data Communications Inc.

900 Corporate Drive
Mahwah, NJ 07430 USA
Tel: (201) 529-1100, Toll free: 1-800-444-7234
Fax: (201) 529-5777
E-mail: market@radusa.com

© 1991–2003 RAD Data Communications Ltd. Publication No. 269-200-09/03

Limited Warranty

RAD warrants to DISTRIBUTOR that the hardware in the RIC-E1 to be delivered hereunder shall be free of defects in material and workmanship under normal use and service for a period of twelve (12) months following the date of shipment to DISTRIBUTOR.

If, during the warranty period, any component part of the equipment becomes defective by reason of material or workmanship, and DISTRIBUTOR immediately notifies RAD of such defect, RAD shall have the option to choose the appropriate corrective action: a) supply a replacement part, or b) request return of equipment to its plant for repair, or c) perform necessary repair at the equipment's location. In the event that RAD requests the return of equipment, each party shall pay one-way shipping costs.

RAD shall be released from all obligations under its warranty in the event that the equipment has been subjected to misuse, neglect, accident or improper installation, or if repairs or modifications were made by persons other than RAD's own authorized service personnel, unless such repairs by others were made with the written consent of RAD.

The above warranty is in lieu of all other warranties, expressed or implied. There are no warranties which extend beyond the face hereof, including, but not limited to, warranties of merchantability and fitness for a particular purpose, and in no event shall RAD be liable for consequential damages.

RAD shall not be liable to any person for any special or indirect damages, including, but not limited to, lost profits from any cause whatsoever arising from or in any way connected with the manufacture, sale, handling, repair, maintenance or use of the RIC-E1, and in no event shall RAD's liability exceed the purchase price of the RIC-E1.

DISTRIBUTOR shall be responsible to its customers for any and all warranties which it makes relating to RIC-E1 and for ensuring that replacements and other adjustments required in connection with the said warranties are satisfactory.

Software components in the RIC-E1 are provided "as is" and without warranty of any kind. RAD disclaims all warranties including the implied warranties of merchantability and fitness for a particular purpose. RAD shall not be liable for any loss of use, interruption of business or indirect, special, incidental or consequential damages of any kind. In spite of the above RAD shall do its best to provide error-free software products and shall offer free Software updates during the warranty period under this Agreement.

RAD's cumulative liability to you or any other party for any loss or damages resulting from any claims, demands, or actions arising out of or relating to this Agreement and the RIC-E1 shall not exceed the sum paid to RAD for the purchase of the RIC-E1. In no event shall RAD be liable for any indirect, incidental, consequential, special, or exemplary damages or lost profits, even if RAD has been advised of the possibility of such damages.

This Agreement shall be construed and governed in accordance with the laws of the State of Israel.

General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

Safety Symbols

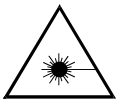
Warning

This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.

Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.

.

Protective earth: the marked lug or terminal should be connected to the building protective earth bus.



Warning

Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached. Please observe the following precautions:

- **Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter.**
- **Do not attempt to adjust the laser drive current.**
- **Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam.**
- **The use of optical devices with the equipment will increase eye hazard.**
- **Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.**

ATTENTION: The laser beam may be invisible!

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.

Handling Energized Products

General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective earth terminal. If an earth lug is provided on the product, it should be connected to the protective earth at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in earthed racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Connection of AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

Connection of DC Mains

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC mains systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

DC units should be installed in a restricted access area, i.e. an area where access is authorized only to qualified service and maintenance personnel.

Make sure that the DC supply is electrically isolated from any AC source and that the installation complies with the local codes.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Before connecting the DC supply wires, ensure that power is removed form the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

Connection of Data and Telecommunications Cables

Data and telecommunication interfaces are classified according to their safety status.

The following table lists the status of several standard interfaces. If the status of a given port differs from the standard one, a notice will be given in the manual.

Ports	Safety Status	
V.11, V.28, V.35, V.36, RS-530, X.21, 10 BaseT, 100 BaseT, Unbalanced E1, E2, E3, STM, DS-2, DS-3, S-Interface ISDN, Analog voice E&M	SELV	Safety Extra Low Voltage: Ports which do not present a safety hazard. Usually up to 30 VAC or 60 VDC.
xDSL (without feeding voltage), Balanced E1, T1, Sub E1/T1	TNV-1	Telecommunication Network Voltage-1: Ports whose normal operating voltage is within the limits of SELV, on which overvoltages from telecommunications networks are possible.
FXS (Foreign Exchange Subscriber)	TNV-2	Telecommunication Network Voltage-2: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are not possible. These ports are not permitted to be directly connected to external telephone and data lines.
FXO (Foreign Exchange Office), xDSL (with feeding voltage), U-Interface ISDN	TNV-3	Telecommunication Network Voltage-3: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are possible.

Always connect a given port to a port of the same safety status. If in doubt, seek the assistance of a qualified safety engineer.

Always make sure that the equipment is grounded before connecting telecommunication cables. Do not disconnect the ground connection before disconnecting all telecommunications cables.

Some SELV and non-SELV circuits use the same connectors. Use caution when connecting cables. Extra caution should be exercised during thunderstorms.

When using shielded or coaxial cables, verify that there is a good ground connection at both ends. The earthing and bonding of the ground connections should comply with the local codes.

The telecommunication wiring in the building may be damaged or present a fire hazard in case of contact between exposed external wires and the AC power lines. In order to reduce the risk, there are restrictions on the diameter of wires in the telecom cables, between the equipment and the mating connectors.

Caution To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cords.

Attention Pour réduire les risques s'incendie, utiliser seulement des conducteurs de télécommunications 26 AWG ou de section supérieure.

Some ports are suitable for connection to intra-building or non-exposed wiring or cabling only. In such cases, a notice will be given in the installation instructions.

Do not attempt to tamper with any carrier-provided equipment or connection hardware.

Electromagnetic Compatibility (EMC)

The equipment is designed and approved to comply with the electromagnetic regulations of major regulatory bodies. The following instructions may enhance the performance of the equipment and will provide better protection against excessive emission and better immunity against disturbances.

A good earth connection is essential. When installing the equipment in a rack, make sure to remove all traces of paint from the mounting points. Use suitable lock-washers and torque. If an external grounding lug is provided, connect it to the earth bus using braided wire as short as possible.

The equipment is designed to comply with EMC requirements when connecting it with unshielded twisted pair (UTP) cables. However, the use of shielded wires is always recommended, especially for high-rate data. In some cases, when unshielded wires are used, ferrite cores should be installed on certain cables. In such cases, special instructions are provided in the manual.

Disconnect all wires which are not in permanent use, such as cables used for one-time configuration.

The compliance of the equipment with the regulations for conducted emission on the data lines is dependent on the cable quality. The emission is tested for UTP with 80 dB longitudinal conversion loss (LCL).

Unless otherwise specified or described in the manual, TNV-1 and TNV-3 ports provide secondary protection against surges on the data lines. Primary protectors should be provided in the building installation.

The equipment is designed to provide adequate protection against electro-static discharge (ESD). However, it is good working practice to use caution when connecting cables terminated with plastic connectors (without a grounded metal hood, such as flat cables) to sensitive data lines. Before connecting such cables, discharge yourself by touching earth ground or wear an ESD preventive wrist strap.

FCC-15 User Information

This equipment has been tested and found to comply with the limits of the Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the Installation and Operation manual, may cause harmful interference to the radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian Emission Requirements

This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Warning per EN 55022 (CISPR-22)

Warning	This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user will be required to take adequate measures.
Avertissement	Cet appareil est un appareil de Classe A. Dans un environnement résidentiel, cet appareil peut provoquer des brouillages radioélectriques. Dans ces cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.
Achtung	Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkströrungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Declaration of Conformity

Manufacturer's Name: RAD Data Communications Ltd.

Manufacturer's Address: 24 Raoul Wallenberg St.
Tel Aviv 69719
Israel

declares that the products:

Product Names: RIC-E1, RIC-T1

conform to the following standard(s) or other normative document(s):

EMC:	EN 55022: 1998	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement.
	EN 50024: 1998	Information technology equipment – Immunity characteristics – Limits and methods of measurement.
Safety:	EN 60950: 2000	Safety of information technology equipment.

Supplementary Information:

The products herewith comply with the requirements of the EMC Directive 89/336/EEC, the Low Voltage Directive 73/23/EEC and the R&TTE Directive 1999/5/EC for wired equipment. The products were tested in a typical configuration.

Tel Aviv, 9th October, 2002

Haim Karshen
VP Quality

European Contact: RAD Data Communications GmbH, Otto-Hahn-Str. 28-30,
85521 Ottobrunn-Riemerling, Germany

Quick Start Guide

If you are familiar with RIC-E1, use this guide to prepare it for operation.

1. Installing RIC-E1

Open the RIC-E1 case by sliding the blue side panel forward and releasing the two screws located on the bottom panel at the rear end of the unit.

Setting the Internal Jumpers

Set the internal jumpers. Refer the first table below, if you operate a standalone RIC-E1, or to the second table, if you use RIC-E1/R.

Jumper	Description	Values	Default Setting
JP1, JP2, JP3, JP4, JP6	Select the E1 interface type	**BAL** – Balanced interface (RJ-45 connector)	BAL
		BNC – Unbalanced interface (BNC coax connectors)	
TX & RX CODE, JP9	Selects the transmit and receive coding	**AMI –** Jumper plug is installed	
		HDB3 – Jumper plug is not installed	HDB3
TIMING, J4	Selects the clock reference	**RCV (pin 4)** – Receive clock	RCV
		EXT (pin 5) – External clock	
		INT (pin 6) – Internal clock	
***Note**: Units with the IR-ETH, IR-ETH/QN and IR-IP interface modules support only receive and internal clocks.*			
ANA LOOP, JP11	Controls the local analog loopback activation	**LOC** – Activates the local analog loopback	
		DTE – Allows the activation of the local analog loopback via DTE	DTE

Jumper	Description	Values	Default Setting
JP2, JP3	Select the E1 interface type	**BALANCE** – Balanced interface (RJ-45 connector) **UNBALANCE** – Unbalanced interface (BNC coax connectors)	BALANCE
ALB DTE, JP4	Enables local analog loopback activation from the DTE (via pin 18 for RS-530 or via pin "JJ" for V.35)	**EN** – The local analog loopback activation from the DTE is enabled **DIS** – The local analog loopback activation from the DTE is disabled	DIS
***Note**: The JP4 jumper is not available for RIC-E1/R cards with X.21 or Ethernet interfaces.*			
PNL SW, JP5	Enables activation of the local analog loopback via the front panel pushbutton	**EN** – The LLB can be activated via the front panel **DIS** – The LLB cannot be activated via the front panel	EN
***Note**: The JP5 jumper is not available for RIC-E1/R cards with IR-ETH and IR-ETH/QN interface modules.* *For RIC-E1/R with IR-IP interface module, the JP5 jumper serves for enabling or disabling the IP LEARN pushbutton.*			
TX&RX CODE, JP6	Selects the data receive and transmit coding	**HDB3** **AMI**	HDB3
TIMING SEL, J2	Selects the clock reference	**RCV** – Receive clock **EXT** – External clock **INT** – Internal clock	RCV
***Note**: Units with the IR-ETH, IR-ETH/QN and IR-IP interface modules support only receive and internal clocks.*			
CHASS GND, J3	Controls the connection between the RIC-E1/R signal ground and the frame (chassis) ground	**CON** – Signal ground is connected to the frame ground **DISCON** – Signal ground is disconnected from the frame ground	CON

Connecting the Cables

➤ **To connect cables:**

1. Connect the E1 line interface.
2. Connect the DTE interface.
3. Connect the power cable (first to the converter, then to the mains supply).

   The PWR LED lights when power is connected.

2. Operating RIC-E1

RIC-E1 operates entirely unattended except when performing system tests.

Contents

Chapter 1. Introduction

1.1 Overview 1-1
Versions 1-1
Application 1-2
1.2 Physical Description 1-2
1.3 Functional Description 1-3
Functional Block Diagram 1-3
Timing Reference 1-3
Diagnostics 1-3
1.4 Technical Specifications 1-4

Chapter 2. Installation and Setup

2.1 Site Requirements and Prerequisites 2-1
2.2 Package Contents 2-1
2.3 Configuring RIC-E1 2-2
Setting the Jumpers 2-2
Connecting the Interfaces 2-4
Connecting the Power 2-5

Chapter 3. Operation

3.1 Front Panel Indicators 3-1
3.2 Operating Instructions 3-2
Turning On 3-2
Operating RIC-E1 3-2
Turning Off 3-2

Chapter 4. Troubleshooting and Diagnostics

4.1 Performing Local Analog Loopback 4-1
Activating Local Analog Loopback 4-1
Deactivating Local Analog Loopback 4-2
4.2 Troubleshooting 4-2

Chapter 5. RIC-E1/R Card

5.1 ASM-MN-214 Card Cage 5-1
Line Connector 5-1
DTE Connector 5-1
5.2 Power Supply 5-3
AC Supply 5-3
DC Supply 5-3
Power Supply with Redundancy 5-3
5.3 RIC-E1/R Front Panel 5-4
5.4 Installing the RIC-E1/R Card 5-6
Setting Internal Jumpers and Switches 5-6
Installing RIC-E1/R into the ASM-MN-214 Card Cage 5-7
Connecting the Interfaces 5-7

Appendix A. Interface Connector Wiring

Appendix B. IR-ETH Interface Module

Appendix C. IR-ETH/QN Interface Module

Appendix D. IR-IP Interface Module

Appendix E. IR-X.21B Interface Module

List of Figures

1-1. Typical Application 1-2
1-2. RIC-E1 and RIC-T1, 3D View 1-2
1-3. RIC-E1 Block Diagram 1-3

2-1. RIC-E1 Jumper Locations 2-3
2-2. RIC-E1 Rear Panel 2-4

3-1. RIC-E1 Front Panel 3-1

4-1. RIC-E1 Local Loopback 4-1

5-1. ASM-MN-214 Rear Panel 5-2
5-2. RIC-E1/R with a Serial DTE Interface 5-4
5-3. RIC-E1/R with IR-ETH or IR-ETH/QN 5-4
5-4. RIC-E1/R with IR-IP 5-4
5-5. ASM-MN-214 Front Panel 5-5
5-6 RIC-E1/R PCB Layout 5-6

List of Tables

2-1. RIC-E1 Jumper Settings 2-3

3-1. RIC-E1 Front Panel LED Indicators 3-1

4-1. RIC-E1 Troubleshooting 4-2

5-1. RIC-E1/R Jumper Settings 5-6

Chapter 1
Introduction

1.1 Overview

RIC-E1 is an interface converter. It converts unframed HDB3 or AMI data of ITU G.703 E1 balanced or unbalanced interface into an interchangeable DTE interface module.

RIC-E1 operates at 2048 kbps. It extracts data and the clock from the G.703 interface via a jitter attenuator to meet ITU G.823 requirements.

RIC-E1 acts as a line transceiver. It provides protection from over-voltage and over-current stress caused by lightning, power crosses and other noise sources.

Versions

The following versions of the RIC-E1 converter are available:

- RIC-E1 standalone unit
- RIC-E1/R – a plug-in card for installation in the ASM-MN-214, 19-inch modem/converter rack, holding up 14 cards (see *Chapter 5* for the RIC-E1/R description).

DTE Interface

RIC-E1 can be ordered with one of the following DTE interfaces:

- V.35
- X.21
- V.36
- RS-530
- Ethernet:
  - IR-ETH (Ethernet bridge)
  - IR-ETH/QN (Ethernet/Fast Ethernet bridge with VLAN support)
  - IR-IP (IP router).

Power Supply

- AC power supply: 100 to 240 VAC
- DC power supply: 24 or -48 VDC.

Application

RIC-E1 is typically used to connect between a G.703 network and a DTE. The DTE can be a multiplexer, a bridge, a router etc. *Figure 1-1* illustrates a typical RIC-E1 application.

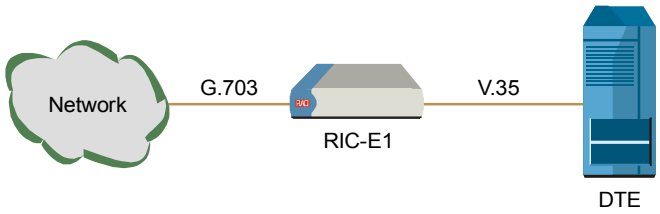


Figure 1-1. Typical Application

1.2 Physical Description

A three-dimensional view of RIC-E1 and RIC-T1 is shown in *Figure 1-2*.

Figure 1-2. RIC-E1 and RIC-T1, 3D View

The RIC-E1 front panel contains LEDs that show the status of the unit. For more information, refer to *Chapter 3*.

The RIC-E1 rear panel contains the DTE interface, the G.703 link and the power connections. For more information, refer to *Chapter 2*.

A description of how to set the internal jumpers can be found in *Chapter 2*.

1.3 Functional Description

Functional Block Diagram

Figure 1-3 shows the functional block diagram of RIC-E1.

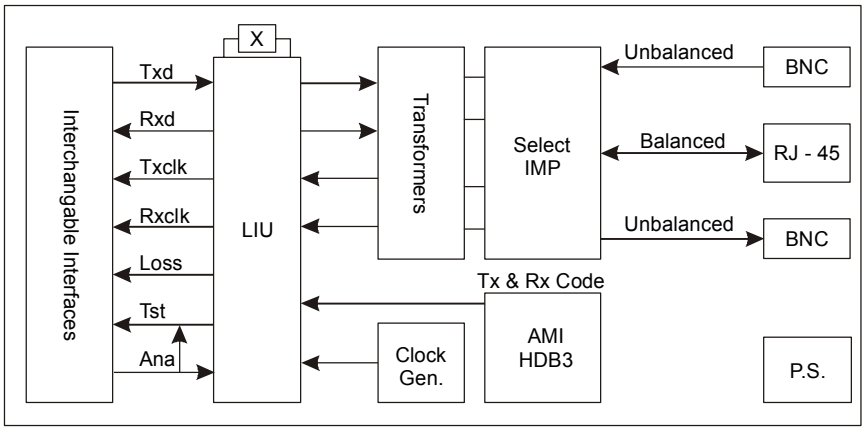


Figure 1-3. RIC-E1 Block Diagram

Timing Reference

RIC-E1 supports three clock modes:

- Internal, derived from its internal oscillator
- External, supplied by the attached DTE
- Receive, recovered from the received line signal.

Diagnostics

RIC-E1 supports a V.54 (loop 3) local loopback activated by the internal jumper of the standalone RIC-E1 unit, front panel pushbutton of the RIC-E1/R card or via corresponding pin of the DTE interface connector (not available for X.21 and Ethernet interfaces). For more information, refer to *Chapter 4*.

1.4 Technical Specifications

Link Interface	*Coding*	HDB3 or AMI
	Framing	Unframed
	Bit Rate	2.048 Mbps
	Impedance	120Ω, balanced 75Ω, unbalanced
	RCV Signal Level	0 to -10 dB
	XMT Signal Level	3V (±10%), balanced 2.37V (±10%), unbalanced
	Connectors	RJ-45, 8-pin, balanced Two BNC coaxial, unbalanced
	Return Loss	Better than 15 dB
DTE Interface	*Type*	• V.35: 34-pin, female • X.21: 15-pin, D-type female • V.36: 37-pin, D-type female, via adapter cable • RS-530: 25-pin, D-type female • IR-ETH: RJ-45 or BNC • IR-ETH/QN: RJ-45 • IR-IP: RJ-45
	Control Signals	V.35, X.21, RS-530: • CTS follows RTS • DCD follows E1 state V.35, RS-530: • DSR is constantly ON
Timing		Derived from three alternative sources: • Internal oscillator • External, from the attached DTE • Receive, derived from the received signal
Indicators	*PWR (green)*	On – RIC-E1 is powered
	TXD (yellow)	On – Data is being transmitted to the link
	RXD (yellow)	On – Data is being received from the link
	LOS (red)	On – No E1 data is received from the link
	TST (red)	On – The local loopback is active

Note *For description of the IR-ETH, IR-ETH/QN and IR-IP interface modules, refer to Appendix B, Appendix C, and Appendix D, respectively.*

Diagnostics		Complies with ITU V.54 (loop 3)
	Local Loopback	Activated by: • Internal jumper (RIC-E1) • Front panel pushbutton (RIC-E1/R) • DTE circuit 141 for V.35, RS-530 and V.36
Power	*AC Source*	100 to 240 VAC (± 10%), 50 or 60 Hz
	DC Source	• -48 VDC (-42 to -60 VDC) • 24 VDC (18 to 32 VDC)
	Power Consumption	• Standalone: 3W, max • RIC-E1/R: 5.2W
	Fuses	Standalone RIC-E1: 250 mA 250V slowblow RIC-E1/R: 500 mA 250V slowblow
Physical	***RIC-E1***	
	Height	39.5 mm / 1.5 in
	Width	190 mm / 7.4 in
	Depth	160 mm / 6.2 in
	Weight	0.6 kg / 1.3 lb
	RIC-E1/R	Fits one slot in the ASM-MN-214 card cage
Environment	*Temperature*	0–50°C (32–122°F)
	Humidity	Up to 90%, non-condensing

Chapter 2

Installation and Setup

This chapter explains how to configure and install RIC-E1.

After the installation is complete, refer to *Chapter 3* for information about operating RIC-E1.

Refer to *Chapter 4* for troubleshooting and diagnostics information.

2.1 Site Requirements and Prerequisites

AC-powered RIC-E1 units should be installed within 1.5m (5 ft) of an easily-accessible grounded AC outlet capable of furnishing the required supply voltage, in the range of 100 to 240 VAC.

DC-powered RIC-E1 units require a -48 or 24 VDC power source, which must be adequately isolated from the mains supply. In order to prevent a fire hazard, a suitable fuse must be installed in the live DC line.

Allow at least 90 cm (36 in) of frontal clearance for operator access and at least 10 cm (4 in) clearance at the rear of the unit for interface cable connections.

The ambient operating temperature of RIC-E1 should be 0 to 50°C (32 to 122°F), at a relative humidity of up to 90%, non-condensing.

2.2 Package Contents

The RIC-E1 package includes the following items:

- RIC-E1 unit
- The AC power cord or DC power supply connector kit
- Ethernet over SDH/SONET and Converters CD
- Jumper plug for JP9 jumper
- CBL-530/449 adapter cable for units ordered with V.36 interface
- RM-29 rack installation kit (if ordered).

2.3 Configuring RIC-E1

This section provides information on the functions and locations of RIC-E1 internal jumpers. Use this information to select the correct setting for your particular application.

➤ **To install RIC-E1:**

1. Determine the required configuration, according to your application, and set the internal jumpers accordingly. For more information, refer to *Setting the Jumpers* on page 2-2.
2. Connect the DTE and G.703 link interfaces, as explained in *Connecting the Interfaces* on page 2-4.
3. Connect the power to the unit. For more information, refer to *Connecting the Power* on page 2-5.

Setting the Jumpers

This section explains how to set the internal jumpers according to your requirements. *Figure 2-1* shows the RIC-E1 jumper locations.

Warning

Avoid adjusting, maintaining or repairing RIC-E1 while it is connected to the power source.
Adjusting, maintaining and repairing RIC-E1, while connected to power supply should only be done by a skilled technician aware of the hazards involved.

Capacitors inside the instrument may still be charged even after the instrument has been disconnected from its source of supply.

➤ **To set the jumpers:**

1. Disconnect the power cable from the mains outlet.
2. Slide the blue side panel forward to detach it from the case.
3. Unscrew the two screws located on the bottom panel at the rear end of the unit.
4. Separate the two halves of the RIC-E1 case by lifting the top cover at the end of the unit and sliding it forward.
5. Adjust the RIC-E1 internal jumpers, as described in *Table 2-1*. *Figure 2-1* shows the jumper locations.
6. Reinstall the cover and tighten the screws.

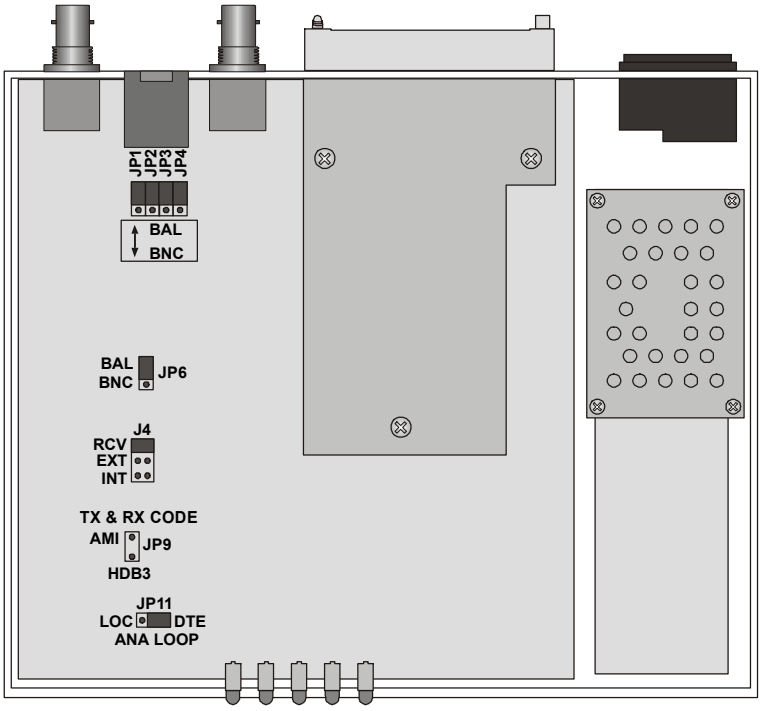


Figure 2-1. RIC-E1 Jumper Locations

Table 2-1. RIC-E1 Jumper Settings

Jumper	Description	Values	Default Setting
JP1, JP2, JP3, JP4, JP6	Select the E1 interface type	**BAL** – Balanced interface (RJ-45 connector)	BAL
		BNC – Unbalanced interface (BNC coax connectors)	
TX & RX CODE, JP9	Selects the transmit and receive coding	**AMI –** Jumper plug is installed	
		HDB3 – Jumper plug is not installed	HDB3
TIMING, J4	Selects the clock reference	**RCV (pin 4)** – Receive clock	RCV
		EXT (pin 5) – External clock	
		INT (pin 6) – Internal clock	
***Note**: Units with the IR-ETH, IR-ETH/QN and IR-IP interface modules support only receive and internal clocks.*			
ANA LOOP, JP11	Controls the local analog loopback activation	**LOC** – Activates the local analog loopback	
		DTE – Allows the activation of the local analog loopback via DTE	DTE

Selecting the Impedance

When RIC-E1 uses the balanced interface:

- Terminate the impedance of G.703 link to 120Ω.
- Use only the RJ-45 connector to transmit full duplex data to the G.703 network over UTP or STP cable.

When RIC-E1 uses the unbalanced interface:

- Terminate the impedance of G.703 link to 75Ω.
- Use only the coaxial BNC connectors to transmit to the G.703 network via two coaxial cables.

Closing the RIC-E1 Case

After completing the internal settings, close the unit case.

➤ **To close the RIC-E1 case:**

1. Position the lower half of the RIC-E1 case on the flat surface.
2. Install the top cover making sure the top cover guides enter the corresponding recesses at the end of the unit.
3. Secure the two screws located at the end of the unit.
4. Fit the inside tabs of the blue side panel into the unit case grooves, and slide the side panel until snaps into place.

Connecting the Interfaces

Figure 2-2 and shows the rear panel of the AC-powered RIC-E1 unit.

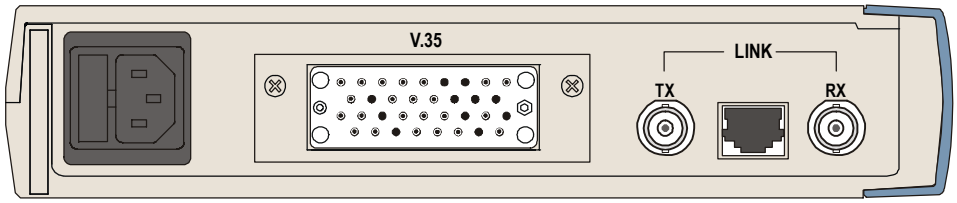


Figure 2-2. RIC-E1 Rear Panel

Connecting the E1 Line

RIC-E1 link interface terminates in balanced and unbalanced connectors, marked LINK.

➤ **To connect the balanced interface:**

- Use RJ-45 male connector and connect it to the RIC-E1 RJ-45 port. *Appendix A* lists the balanced connector pin assignment.

➤ **To connect the unbalanced interface:**

1. Connect the receive line to the back panel connector designated TX.
2. Connect the transmit line to the back panel connector designated RX.

Warning

Do not connect both balanced and unbalanced connectors.

Connecting the DTE

RIC-E1 supports various types of data channel interfaces. Equipment with V.35, X.21, RS-530 and Ethernet interfaces can be connected directly to the RIC-E1 DTE port. The RIC-E1 V.36 interface is provided via an adapter cable converting between 25-pin RS-530 connector and 37-pin V.36 connector.

Connector pin allocations and cable wiring data appear in *Appendix A*. For the detailed description of the IR-ETH, IR-ETH/QN, and IR-IP Ethernet interface modules, refer to *Appendix B*, *Appendix C*, and *Appendix D,* respectively.

Connecting the Power

Refer to the appropriate section below depending on the RIC-E1 version – AC or DC.

Connecting the AC Power

AC power should be supplied to the RIC-E1 unit through the 1.5m (5 ft) standard power cable terminated with a standard 3-prong plug. The cable is provided with the unit.

Warning

Before connecting power to the unit, verify that the socket outlet is provided with a protective ground contact. If you are using an extension cord (power cable) make sure it is grounded as well

Interrupting the protective (grounding) conductor (inside or outside the unit), or disconnecting the protective ground terminal can make this unit dangerous.

Make sure that only fuses of the required rating (0.250A, 250V) are used for replacement. Do not use repaired fuses or short-circuit the fuse holder. Always disconnect the mains cable before removing or replacing the fuse. If there is a chance that the fuse protection has been damaged, make the unit inoperative.

➤ **To connect AC power to RIC-E1:**

1. Connect the power cable to the power connector on the RIC-E1 rear panel.
2. Plug the RIC-E1 power cable to the mains outlet.

   RIC-E1 turns on automatically upon connection to the mains.

Connecting the DC Power

➤ **To connect DC power:**

- Refer to the DC power supply connection supplement.

Chapter 3

Operation

This chapter describes how to operate RIC-E1. Installation procedures explained in *Chapter 2* must be completed and checked before attempting to operate RIC-E1.

3.1 Front Panel Indicators

Figure 3-1 shows the RIC-E1 front panel. The front panel indicators are described in *Table 3-1*.

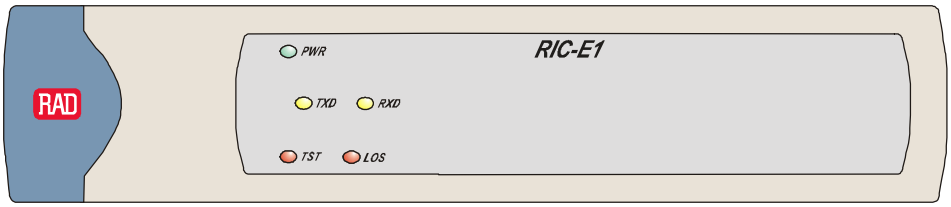


Figure 3-1. RIC-E1 Front Panel

Table 3-1. RIC-E1 Front Panel LED Indicators

Designation	Color	Function
PWR	Green	ON – RIC-E1 is powered up
TXD	Yellow	ON – Data is being transmitted to the link
RXD	Yellow	ON – Data is being received from the link
LOS	Red	ON – No E1 data is received from the link
TST	Red	ON – The local loopback is active

3.2 Operating Instructions

Turning On

RIC-E1 starts operating as soon as AC or DC power is connected. Always connect the power cable to the RIC-E1 power connector first and then to the mains outlet.

The PWR LED lights when power is connected.

Operating RIC-E1

RIC-E1 operates entirely unattended except when performing system tests.

Turning Off

To turn RIC-E1 off, disconnect the power cable from the mains outlet.

Chapter 4

Troubleshooting and Diagnostics

4.1 Performing Local Analog Loopback

RIC-E1 supports activation of a V.54 diagnostic (loop 3) local loopback.

This loopback checks the communication and connection between RIC-E1 and the attached DTE, as shown in *Figure 4-1*. When RIC-E1 performs a local loopback, the data received from the local transmitter is both transmitted on the line and looped back to the local receiver at the digital level. This checks the operation of all local digital circuitry.

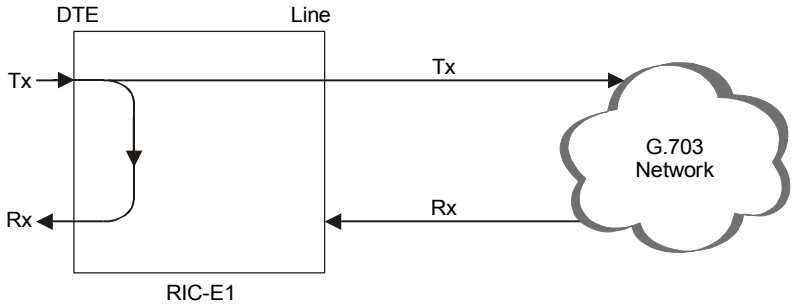


Figure 4-1. RIC-E1 Local Loopback

Activating Local Analog Loopback

You can activate the local analog loopback via DTE interface circuit 141 (for V.35, RS-530 and V.36 interfaces only).

Note *When activating the local analog loopback via interface of the DTE connected to the RIC-E1/R card, make sure to set the ALB DTE jumper (JP4) to EN.*

Alternatively, you can initiate the loopback via internal jumper of the standalone RIC-E1 or by pressing the ANA pushbutton on the RIC-E1/R panel.

Warning **Do not touch any components other than ANA LOOP (JP11) jumper plug while activating the local loopback from the standalone RIC-E1, in order to avoid electrical shock.**

➤ **To activate the local analog loopback from the standalone RIC-E1:**

1. Open the RIC-E1 case, as described in *Chapter 2*.
2. Set the JP11 jumper to LOC.

   The analog loopback is activated and the TST indicator on the front panel turns on.

➤ **To activate the local analog loopback from RIC-E1/R:**

- Press the ANA pushbutton on the RIC-E1/R front panel.
  Make sure that the PNL SW jumper (JP5) on the RIC-E1/R board is set to EN.

  The TST indicator on the front panel turns on.

Deactivating Local Analog Loopback

➤ **To deactivate the local analog loopback from the DTE:**

- Lower the circuit 141 pins of the DTE interface.

➤ **To deactivate the local analog loopback from the standalone RIC-E1:**

- Set the RIC-E1 JP11 jumper to DTE.

  The TST indicator on the front panel turns off.

➤ **To deactivate the local analog loopback from the standalone RIC-E1/R:**

- Press the RIC-E1/R ANA pushbutton again to return it to the previous position.

4.2 Troubleshooting

Table 4-1 contains troubleshooting information to help you identify and correct problems.

Table 4-1. RIC-E1 Troubleshooting

Trouble Symptoms	Probable Cause	Corrective Measures
All front panel indicators are OFF	1. No power	Check that both ends of the power cable are properly connected.
	2. Blown fuse	Disconnect power cable from both ends and replace the fuse with another fuse of proper rating.
LOS indicator is ON	1. Receive line fuses are blown	Disconnect power cable from both ends and replace the fuses with new fuses of proper rating.
	2. Line cables are not properly connected	Check and adjust both ends of the line cables.
	3. Unbalanced BNC connectors are reversed	Switch the two BNC connectors.
	4. The transformer is damaged	Replace RIC-E1.

Chapter 5

RIC-E1/R Card

This chapter describes the RIC-E1/R card version, designed for installation in the ASM-MN-214 card cage. The chapter contains the following sections:

- The ASM-MN-214 card cage
- The RIC-E1/R card version
- Power supply to RIC-E1/R card
- Installing the RIC-E1/R card.

5.1 ASM-MN-214 Card Cage

The ASM-MN-214 card cage contains one or two power supplies and up to 14 plug-in cards. The card types can be RIC-E1/R or other RAD rack version modems/converters – any combination of up to 14 plug-in cards.

For each of the 14 cards, the rear panel (see *Figure 5-1*) contains a male connector for the terminal block and a DB-25 connector. A protection cover protects the terminal block connectors.

Line Connector

The line is to be attached to the rear panel terminal block connectors (see *Figure 5-1*). It contains screws for connecting the transmit and receive pairs and ground, if present. When operating RIC-E1/R with unbalanced E1 interface, use a CIA/TB-BNC/214 adapter, which converts the terminal block connector into two coaxial BNC connectors (see *Figure 5-1*).

The ASM-MN-214 card cage is also available with BNC coaxial unbalanced or RJ-45 balanced line connectors.

DTE Connector

The 25-pin D-type female interface connector provides all interface signals for the digital interfaces. Units with X.21 or V.35 interface require an external mechanical adapter. Two optional interface attachments, CIA/X21/1 and CIA/V.35/1, can be ordered separately from RAD. CIA/X.21/1 converts one DB-25 connector to an X.21 15-pin connector. CIA/V.35/1 converts one DB-25 connector to a V.35 34-pin connector.

V.36 converter cards are supplied with a RAD adapter cable CBL-530/449F, which converts between the DB-25 connector and a V.36 37-pin connector.

RIC-E1/R with one of the Ethernet interfaces (IR-ETH, IR-ETH/QN or IR-IP) uses a CIA/ETH interface adapter, which converts one DB-25 connector to an RJ-45 connector.

The adapter cable and interface attachments are also shown in *Figure 5-1*.

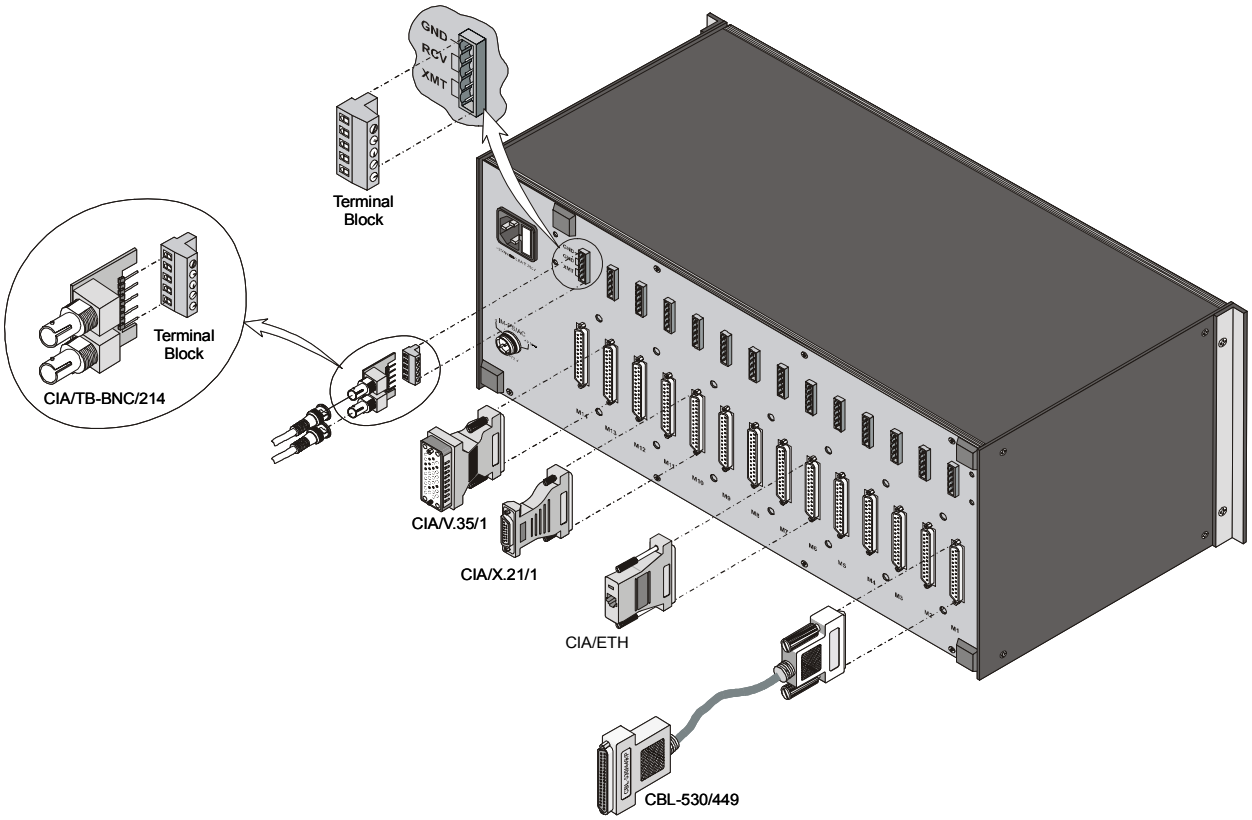


Figure 5-1. ASM-MN-214 Rear Panel

5.2 Power Supply

Power is supplied to the RIC-E1/R card from the ASM-MN-214 power supply via the chassis. Each RIC-E1/R card has two fuses (F5 and F6), which protect the entire system against power failure resulting from a short circuit in one card. The rating of the fuses is 500 mA, 250V, slowblow (see *Figure 5-6*).

The ASM-MN-214 card cage can accept both AC or DC power supplies. LED indicators located on the ASM-MN-214 front panel (see *Figure 5-5*) show activity when the power supply is connected to the mains plug. The power supply supports the full card cage with any combination of cards.

AC Supply

The AC power supply of the ASM-MN-214 is 100, 115, or 230 VAC, ±10%, 47 to 63 Hz.

DC Supply

The DC power supply is -48 VDC (-36 to -72 VDC) or 24 VDC (18 to 32 VDC). It uses a DC/DC converter module to provide the power required for the cards.

Power Supply with Redundancy

This special ordering option is equipped with two separate power supplies, operating together and sharing the load of the whole card cage. If either of the power supplies fails, the other one will continue to supply power to the full card cage.

Two LED indicators show activity of each power supply. They should both light when mains power is provided.

Note *It is possible to combine AC and DC power supplies in the same cage.*

5.3 RIC-E1/R Front Panel

Figure 5-2, *Figure 5-3* and *Figure 5-4* show the RIC-E1/R card front panel options. The LEDs of the card version with serial DTE interface are identical in their functionality to those of the standalone device, except for the ANA pushbutton. The ANA pushbutton serves for activation of the local analog loopback, see *Chapter 4* for the details.

Front panels of the RIC-E1/R converters with the IR-ETH, IR-ETH/QN and IR-IP interfaces are described in greater detail in *Appendix B*, *Appendix C* and *Appendix D*, respectively.

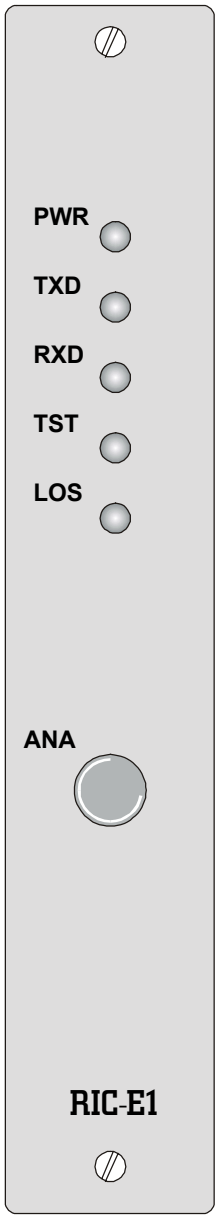


Figure 5-2. RIC-E1/R with a Serial DTE Interface

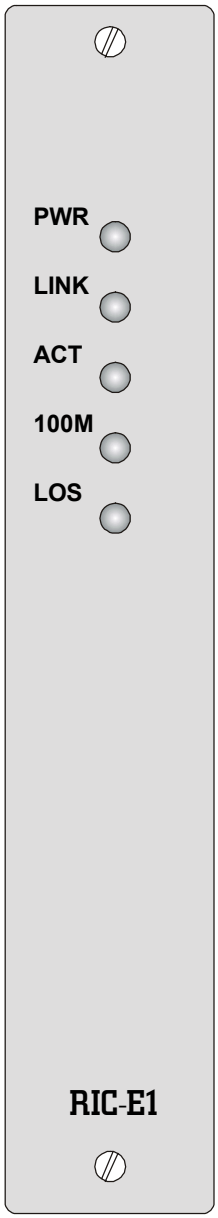


Figure 5-3. RIC-E1/R with IR-ETH or IR-ETH/QN

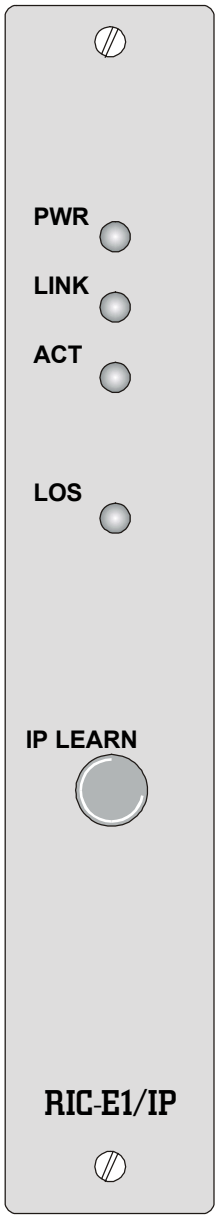


Figure 5-4. RIC-E1/R with IR-IP

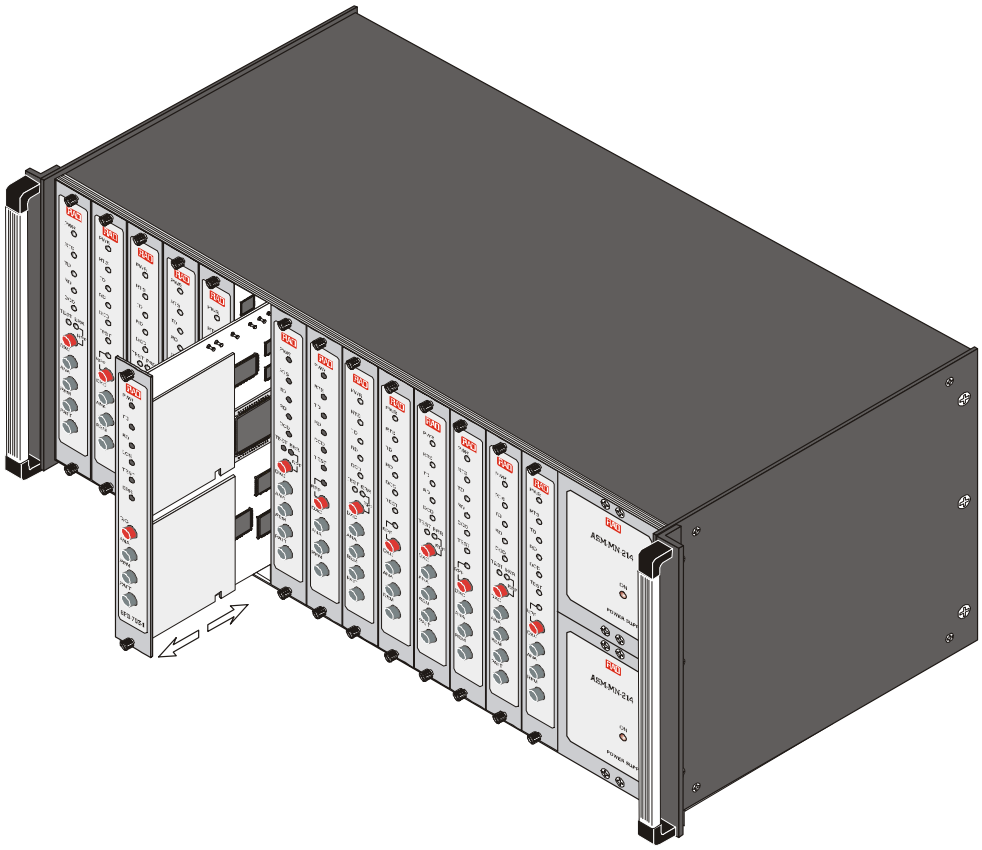


Figure 5-5. ASM-MN-214 Front Panel

5.4 Installing the RIC-E1/R Card

Setting Internal Jumpers and Switches

Figure 5-6 illustrates location of the internal jumpers on the RIC-E1/R PCB.

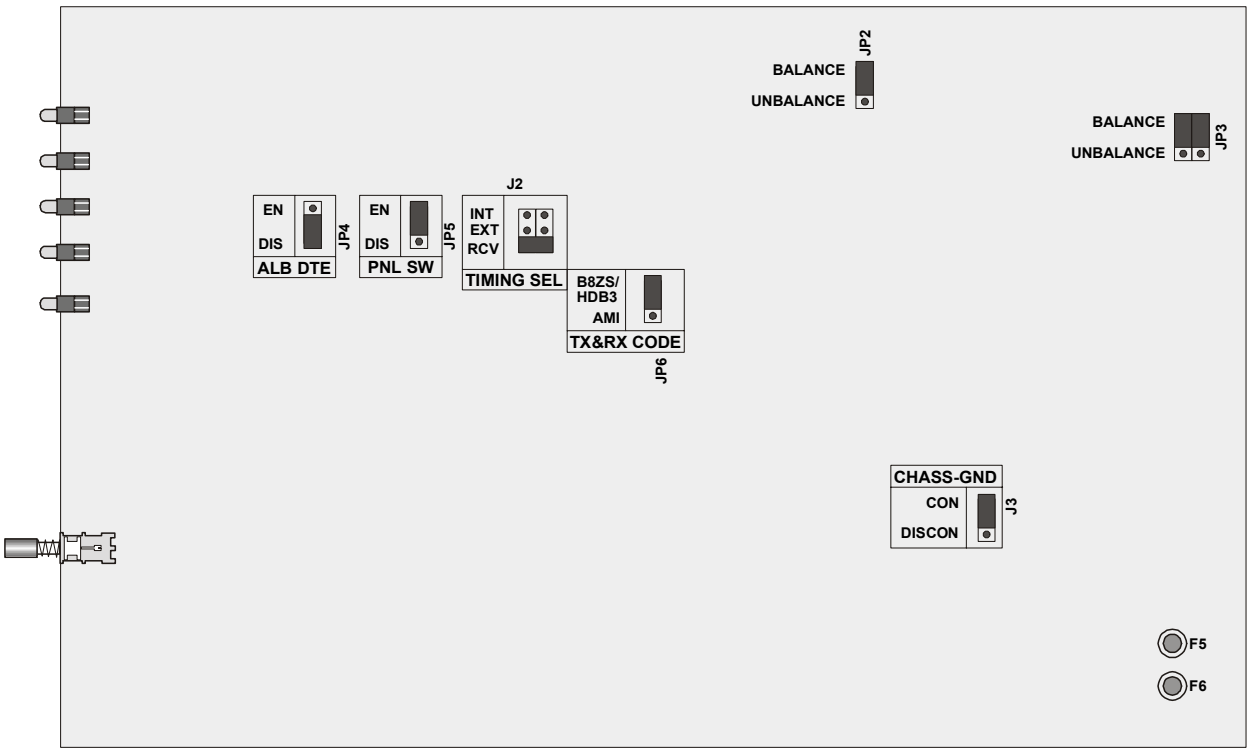


Figure 5-6 RIC-E1/R PCB Layout

Table 5-1. RIC-E1/R Jumper Settings

Jumper	Description	Values	Default Setting
JP2, JP3	Select the E1 interface type	**BALANCE** – Balanced interface (RJ-45 connector)	BALANCE
		UNBALANCE – Unbalanced interface (BNC coax connectors)	
ALB DTE, JP4	Enables local analog loopback activation from the DTE (via pin 18 for RS-530 or via pin "JJ" for V.35)	**EN** – The local analog loopback activation from the DTE is enabled	
		DIS – The local analog loopback activation from the DTE is disabled	DIS
***Note**: The JP4 jumper is not available for RIC-E1/R cards with X.21 or Ethernet interfaces.*			

Table 5-1. RIC-E1/R Jumper Settings (Cont.)

Jumper	Description	Values	Default Setting
PNL SW, JP5	Enables activation of the local analog loopback via the front panel pushbutton	**EN** – The LLB can be activated via the front panel **DIS** – The LLB cannot be activated via the front panel	EN
***Note**: The JP5 jumper is not available for RIC-E1/R cards with IR-ETH and IR-ETH/QN interface modules.* *For RIC-E1/R with IR-IP interface module, the JP5 jumper serves for enabling or disabling the IP LEARN pushbutton.*			
TX&RX CODE, JP6	Selects the data receive and transmit coding	**HDB3** **AMI**	HDB3
TIMING SEL, J2	Selects the clock reference	**RCV** – Receive clock **EXT** – External clock **INT** – Internal clock	RCV
***Note**: Units with the IR-ETH, IR-ETH/QN and IR-IP interface modules support only receive and internal clocks.*			
CHASS GND, J3	Controls the connection between the RIC-E1/R signal ground and the frame (chassis) ground	**CON** – Signal ground is connected to the frame ground **DISCON** – Signal ground is disconnected from the frame ground	CON

Installing RIC-E1/R into the ASM-MN-214 Card Cage

➤ **To install the RIC-E1/R card in the ASM-MN-214 card cage:**

1. Install the ASM-MN-214 card cage in the 19-inch rack.
2. Insert the RIC-E1/R card into one of the ASM-MN-214 slots.
3. Push the card into the cage until it is fully inserted into the edge connector inside the rack.
4. Tighten the screws on front panel of the modem card.

Connecting the Interfaces

RIC-E1/R uses the ASM-MN-214 rear panel terminal block ports for the line connections. The 25-pin D-type female connector serves as a DTE port.

1. Remove the protection cover from the terminal block connectors.
2. Connect the terminal block to the ASM-MN-214 terminal block connector.
3. Connect the line to the terminal block as follows: connect transmit pair to the terminals marked XMT, the receive pair to the terminals marked RCV, and the fifth screw to ground (optional).

4. When operating RIC-E1/R with unbalanced interface, use CIA/TB-BNC/214 adapter, which converts the terminal block connector into two coaxial BNC connectors.
5. If required, attach the appropriate CIA (CIA/X.21/1, CIA/V.35/1, CIA/ETH) or CBL-530/449F adapter cable to the DB-25 connector on the card cage rear panel.
6. Connect the DTE cable to the DB-25 connector, other side of CIA or adapter cable (depending on your version of the card interface).
7. Connect power to the ASM-MN-214 card cage:
   - To connect AC power, connect the power cable to the mains supply.
   - To connect DC power, refer to DC power supply connection supplement of the ASM-MN-214 installation and operation manual.

Warning

The ASM-MN-214 card cage has no power switch. Operation starts when the power is applied to the rear panel POWER connector. When applying power, first connect the plug of the power cord to the ASM-MN-214 POWER connector and then to the mains (outlet).

Appendix A
Interface Connector Wiring

A.1 V.35, X.21 and RS-530 Interface Connectors

Table A-1 lists the pin assignments of the V.35, X.21 and RS-530 interface connectors.

Table A-1. V.35, X.21 and RS-530 Interfaces, Pin Assignments

Signal Function	V.35, 34-Pin			RS-530, DB-25			X.21, DB-15		
	Pin		Circuit	Pin		Circuit	Pin	[Function]	Circuit
Protective Ground	A	Frame	101	1		101	1	[SHIELD]	101
Signal Ground	B	Signal GND	102	7	AB	102	8	[GND]	102
Transmitted Data	P S	TD(A) TD(B)	103 103	2 14	BA(A) BA(B)	103 103	2 9	T(A) T(B) [Transmit]	103 103
Received Data	R T	RD(A) RD(B)	104 104	3 16	BB(A) BB(B)	104 104	4 11	R(A) R(B) [Receive]	104 104
Request to Send	C	RTS	105	4 19	CA(A) CA(B)	105	3 10	C(A) C(B) [Control]	105
Clear to Send	D	CTS	106	5 13	CB(A) CB(B)	106			106
Data Set Ready	E	DSR	107	6 22	CC(A) CC(B)	107			107
Data Terminal Ready	H	DTR	108	20 23	CD(A) CD(B)	108			108
Carrier Detect	F	DCD	109	8 10	CF(A) CF(B)	109	5 12	I (A) I (B) [Indication]	109
External Transmit Clock	U W	SCTE(A) SCTE(B)	113 113	24 11	DA(A) DA(B)	113 113	7 14	(A) (B)	113 113

Table A-1. V.35, X.21 and RS-530 Interfaces, Pin Assignments (Cont.)

Signal Function	V.35, 34-Pin			RS-530, DB-25			X.21, DB-15		
	Pin		Circuit	Pin		Circuit	Pin	[Function]	Circuit
Transmit Clock	Y AA	SCT(A) SCT(B)	114 114	15 12	DB(A) DB(B)	114 114	6 13	S(A) S(B) [Signal Timing]	114 114
Receive Clock	V X	SCR(A) SCR(B)	115 115	17 9	DD(A) DD(B)	115 115			115 115
Local Analog Loop	Jj	LLB	141	18	LL	141			LLB
Test Indicator	Kk	TM	142	25	TM	142			TM

A.2 V.36 Interface Connector

The RIC-E1 V.36 interface is provided via an adapter cable converting between 25-pin RS-530 connector and 37-pin V.36 connector. *Table A-2* lists the cable wiring.

Table A-2. Cable Converting between RS-530 and V.36 Interfaces, Pin Assignment

Signal Function	V.36, 37-Pin		RS-530, 25-pin	
	Pin	Circuit	Pin	Circuit
Protective Ground	1	Shield	1	
Signal Ground	19	SG	7	AB
DTE Common Return	37	SC		
DCE Common Return	20	RC		
Transmitted Data	4 22	SD (A) SD (B)	2 14	BA (A) BA (B)
Received Data	6 24	RD (A) RD (B)	3 16	BB (A) BB (B)
Request to Send	7 25	RS (A) RS (B)	4 19	CA (A) CA (B)
Clear to Send	9 27	CS (A) CS (B)	5 13	CB (A) CB (B)
Data Set Ready	11 29	DM (A) DM (B)	6 22	CC (A) CC (B)
Data Terminal Ready	12 30	TR (A) TR (B)	20 23	CD (A) CD (B)

Table A-2. Cable Converting between RS-530 and V.36 Interfaces, Pin Assignment (Cont.)

Signal Function	V.36, 37-pin		RS-530, 25-pin	
	Pin	Circuit	Pin	Circuit
Carrier Detect	13 31	RR (A) RR (B)	8 10	CF (A) CF (B)
External Transmit Clock	17 35	TT (A) TT (B)	24 11	DA (A) DA (B)
Transmit Clock	5 23	ST (A) ST (B)	15 12	DB (A) DB (B)
Receive Clock	8 26	RT (A) RT (B)	17 9	DD (A) DD (B)
Local Analog Loopback	10	LL	18	LL
Remote Loopback	14	RL	21	RL
Test Indicator	18	TM	25	TM

A.3 Line Interface Connector

The balanced line interface terminates in 8-pin RJ-45 connector, wired in accordance with *Table A-3*.

Table A-3. RJ-45 Line Interface Connector, Pin Assignment

Pin	Function
1, 2	Transmit
4, 5	Receive
3, 6	GND

Appendix B

IR-ETH Interface Module

IR-ETH is an interface module for RAD products, which is used for converting the Ethernet (10BaseT or 10Base2) electrical levels to the TTL levels. It also converts the Ethernet protocol to HDLC to enable long-distance transmission and avoid the Ethernet collision limitation.

IR-ETH includes an internal, self-learning Ethernet bridge, which enables a high performance link between two Ethernet segments at a low transmission rate. The low-speed HDLC transmission is sent over the G.703 link.

Figure B-1 shows a typical application using RIC-E1 with IR-ETH module.

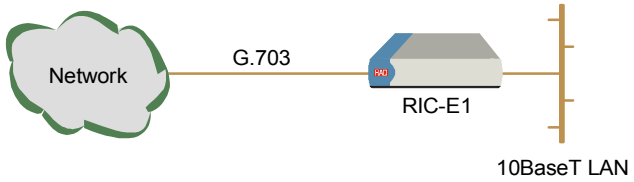


Figure B-1. Typical Application of RIC-E1 with IR-ETH Module

B.1 IR-ETH Options

Standalone RIC-E1

Figure B-2 shows the rear panel of RIC-E1 with the IR-ETH module.

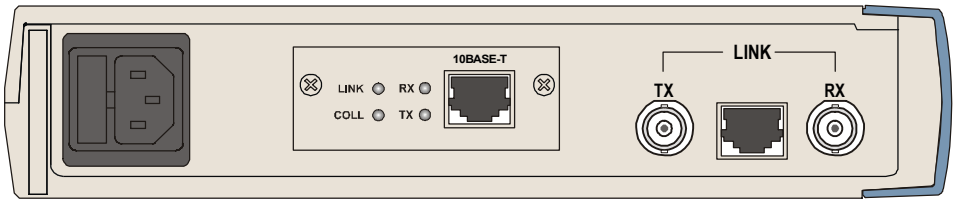


Figure B-2. Rear Panel of the RIC-E1 with IR-ETH Module (10BaseT Connector)

Table B-1 provides the pinout of the IR-ETH RJ-45 connector.

Table B-1. RJ-45 Pinout

Pin	Name	Function
1	TD (+)	Transmit data positive
2	TD (-)	Transmit data negative
3	RD (+)	Receive data positive
6	RD (-)	Receive data negative

RIC-E1/R Card

Figure B-3 illustrates the front panel of RIC-E1/R with IR-ETH.

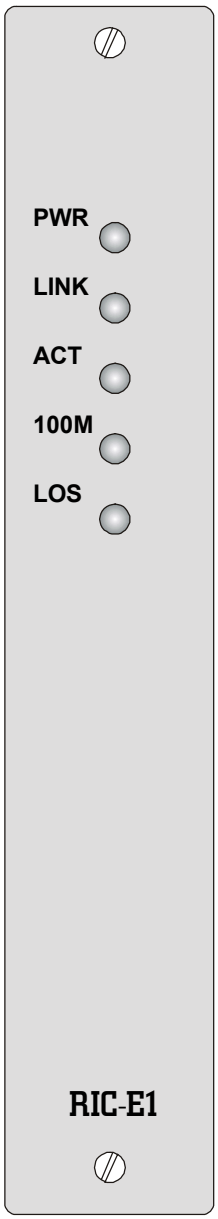


Figure B-3. RIC-E1/R with IR-ETH

B.2 Technical Specifications

General	*LAN Table*	10,000 addresses
	Filtering and Forwarding	15,000 frames per second
	Buffer	256 frames
	Delay	1 frame
LAN	*Standard*	Conforms to IEEE 802.3/Ethernet
	Data Rate	10 Mbps (20 Mbps 10BaseT FDX)
	Connectors	• 10BaseT (UTP): Shielded RJ-45 • 10Base2: BNC connector
WAN	*Protocol (internal)*	HDLC
	Data Rate	E1 (2048 kbps)

B.3 Installation and Operation

Figure B-4 shows the rear panel of the IR-ETH module with 10BaseT connector. *Figure B-5* shows the ERR D4 LED and the DIP switch, which are located on the reverse side of the IR-ETH module installed in the standalone unit.
The DIP switch and the LED are located on the top panel of the IR-ETH module installed in the RIC-E1/R card.

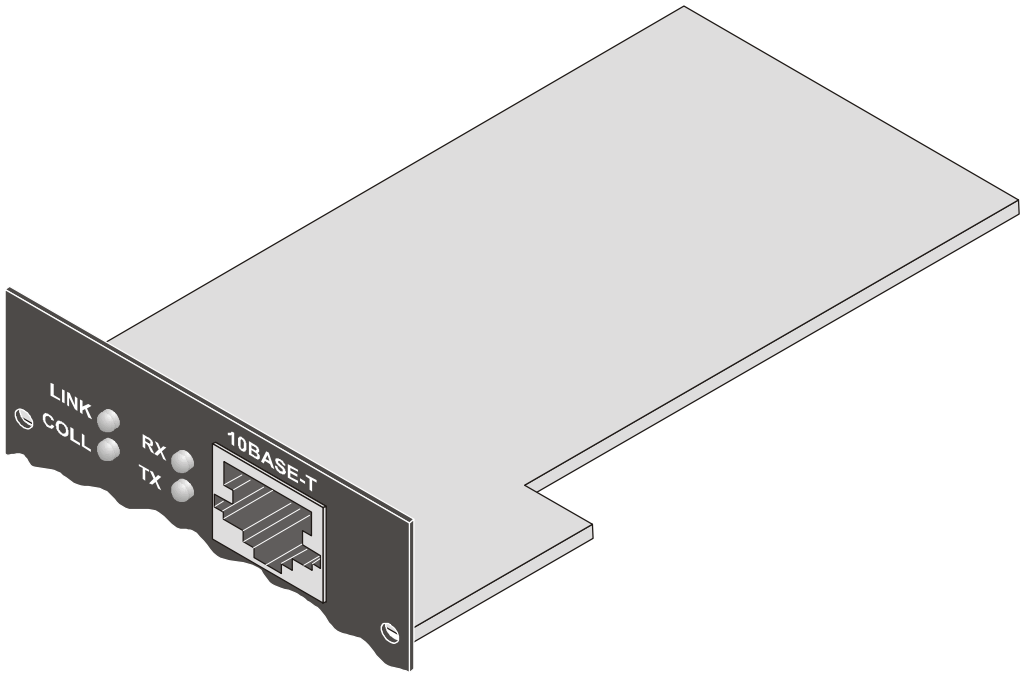


Figure B-4. IR-ETH Rear Panel (10BaseT Connector)

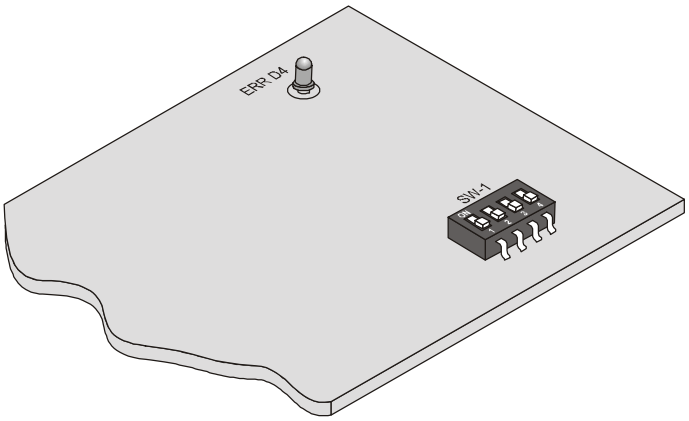


Figure B-5. IR-ETH DIP Switch and LED Locations

Setting the DIP Switch

Table B-2 describes functions and default settings of the DIP switch SW-1 sections.

The DIP switch is located on the reverse side of the IR-ETH module. To change the switch settings, you must undo three screws on the board and detach the module from the main unit.

Table B-2. DIP Switch Settings

Section	Name	Description	Default Setting
1	SQ/FD	ON – Full-duplex operation	
		OFF – Half-duplex operation	OFF
2	CMP	ON – Strips padding bits inserted in 64-byte frame	
		OFF – Transmits frames over WAN as is	OFF
3	FIL	ON – Passes only frames destined for another LAN	
		OFF – Disables LAN filter; passes all frames transparently	OFF
4	–	–	Permanently OFF

LED Indicators

Table B-3 and *Table B-4* list the IR-ETH LED indicators and describe their functions.

Table B-3. IR-ETH LED Indicators, Standalone RIC-E1

LED Name	Description	Location	Color
LINK	ON – Good link integrity	Rear panel	Green
***Note**: The LINK indicator is not available for the IR-ETH module with BNC connector.*			
COLL	ON – Collision occurred on the attached Ethernet segment	Rear panel	Yellow
RX	ON – Data is received from the Ethernet attached segment	Rear panel	Yellow
TX	ON – Data is transmitted from RIC-E1 to the attached Ethernet segment	Rear panel	Yellow
ERR D4	ON – Bridge buffer overrun	IR-ETH board	Red

Table B-4. IR-ETH LED Indicators, RIC-E1/R

LED Name	Description	Location	Color
PWR	ON – RIC-E1/R is powered up	Front panel	Green
LINK	ON – LAN is connected to the IR-ETH module	Front panel	Green
ACT	ON – LAN is receiving/transmitting data	Front panel	Yellow
100M	Not relevant for IR-ETH	Front panel	Green
LOS	ON – No E1 data is received from the link	Front panel	Red
ERR D4	ON – Bridge buffer overrun	On the IR-ETH board	Red

Connecting the LAN

Use either a straight cable or a cross-cable for the LAN connection. Use a cross cable when connecting to a port that does not implement the crossover function internally. Otherwise, use a straight cable.

Note *Hubs usually do implement the crossover function internally, while network interface cards and other devices do not.*

Appendix C

IR-ETH/QN Interface Module

The IR-ETH/QN interface module includes a high performance self-learning Fast Ethernet bridge, which is connected to the LAN via a single 10BaseT or 100BaseT port, operating in full or half duplex and providing simple and cost-effective interconnection between 10/100BaseT LANs. The IR-ETH/QN interface module also supports IEEE 802.1p frames and IEEE 802.1q frames, enabling VLAN applications.

The module automatically learns MAC addresses of the LAN to which it is connected. Its LAN table stores up to 1,024 addresses with 5-minute automatic aging.

Filtering and forwarding is performed at the maximum theoretical rate of 150,000 packets per second (wire speed). The buffer with 0.512 Mbit SRAM can hold 85 frames with a throughput latency of one frame. The forwarding of the multicast messages from LAN to WAN can be disabled.

Figure C-1 shows a typical application using RIC-E1 with IR-ETH/QN module.

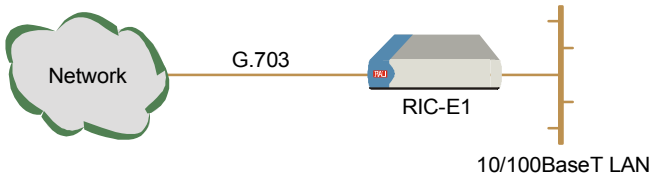


Figure C-1. Typical Application of RIC-E1 with IR-ETH/QN Module

C.1 IR-ETH/QN Options

Standalone RIC-E1

Figure C-2 shows the rear panel of the standalone RIC-E1, equipped with IR-ETH/QN module. *Table C-1* lists the module's RJ-45 connector pinout.

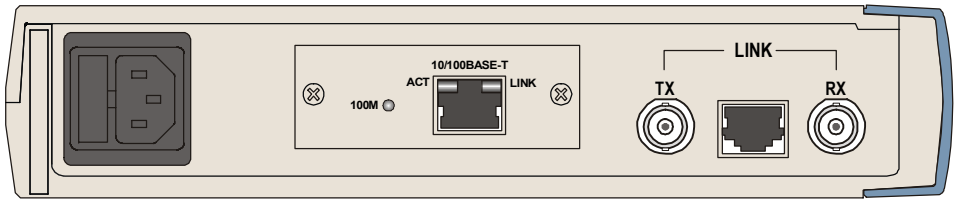


Figure C-2. Rear Panel of RIC-E1 with IR-ETH/QN Module

Table C-1. RJ-45 Connector Pinout

Pin	Name	Function
1	TD (+)	Transmit data positive
2	TD (-)	Transmit data negative
3	RD (+)	Receive data positive
6	RD (-)	Receive data negative

RIC-E1/R Card

Figure C-3 illustrates the front panel of RIC-E1/R with IR-ETH/QN.

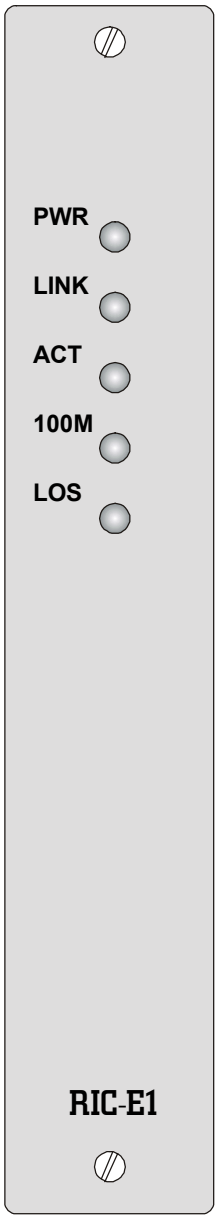


Figure C-3. RIC-E1/R with IR-ETH/QN

C.2 Technical Specifications

Bridge	*LAN Table*	1,024 MAC addresses
	Aging	5 minute, automatic
	Filtering and Forwarding Rate	150,000 packets per second
	Buffer Size	85 frames
	Delay	1 frame
LAN	*Standard*	IEEE 802.3/Ethernet V.2, IEEE 802.1q (relevant parts), 802.1p, 802.3x
	Data Rate	• 10BaseT: 10 Mbps • 100BaseT: 100 Mbps
	Transmission Line	4-wire, Category 5 UTP, 19 AWG to 26 AWG
	Line Code	• 10BaseT: Manchester • 100BaseT: MLT3
	Connector	RJ-45
WAN	*Protocol*	Point-to-point
	Data Rate	Up to 2048 kbps

C.3 Installation and Operation

Figure C-4 shows the DIP switch locations on the IR-ETH/QN PCB.

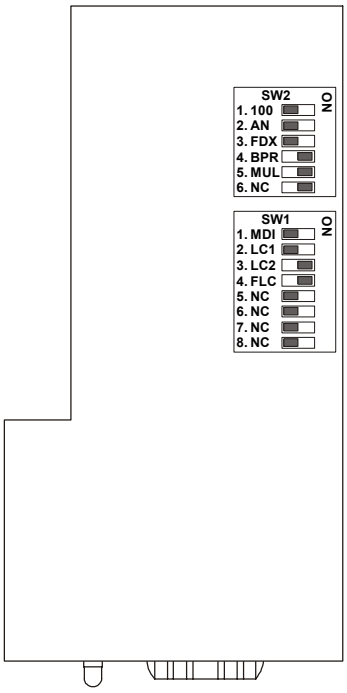


Figure C-4. SW1 and SW2 DIP Switch Locations

Setting the DIP Switches

Configure the IR-ETH/QN module by setting the DIP switches SW1 and SW2 in accordance with *Figure C-4*, *Table C-2* and *Table C-3*.

Note *To make the changes effective, you must restart RIC-E1 by turning it off and on.*

Table C-2. DIP SW1 Switch Settings

Section	Name	Description	Possible Settings	Factory Setting
1	MDI	Enables or disables automatic MDI/MDIX crossover	**ON –** Automatic MDI/MDIX crossover is disabled	
			OFF – Automatic MDI/MDIX crossover is enabled	OFF
Note: *Automatic MDI/MDIX crossover function is available only if the autonegotiation is enabled (see Table C-3).*				
2,3	LC1, LC2	–	–	–
4	FLC	Enables or disables flow control	**ON** – Flow control is enabled	ON
			OFF – Flow control is disabled	
5-8	NC	–	–	–

Note *Sections 2, 3, 5, 6, 7 and 8 of the SW1 DIP switch are factory-set and must not be moved by the user.*

Table C-3. DIP Switch SW2 Settings

Section	Name	Description	Possible Settings	Factory Setting
1	100	Selects the LAN speed	**ON** – LAN speed is set to 10 Mbps	
			OFF – LAN speed is set to 100 Mbps	OFF
2	AN	Controls the LAN autonegotiation	**ON** – LAN autonegotiation is disabled	
			OFF – LAN autonegotiation is enabled	OFF
3	FDX	Selects the LAN mode	**ON** – LAN half duplex mode	
			OFF – LAN full duplex mode	OFF
4	BPR	Controls the backpressure	**ON** – Backpressure is enabled	ON
			OFF – Backpressure is disabled	
5	MUL	Controls LAN to WAN multicasting	**ON** – Multicast messages from LAN to WAN are not blocked	ON
			OFF – Multicast messages from LAN to WAN are blocked	
6	NC	–	–	ON

Note

- *Section 6 of the SW2 DIP switch is factory-set and must not be moved by the user.*
- *When autonegotiation is enabled, LAN speed and LAN mode are configured automatically (sections 1 and 3 are disabled).*

LED Indicators

Table C-4 lists the IR-ETH/QN LED indicators and describes their functions.

Table C-4. IR-ETH/QN LED Indicators

LED	Color	Function
LINK	Green	ON – LAN is connected
ACT	Yellow	Blinks – Transmit/receive activity is detected on the Ethernet link
100M	Green	ON – LAN is operating at 100 Mbps

Connecting the LAN

Use either a straight cable or a cross cable for the LAN connection.
Use a cross cable when connecting to a port that does not implement the crossover function internally. Otherwise, use a straight cable.

Note *Hubs usually implement the crossover function internally, while NICs and other devices do not.*

Appendix D
IR-IP Interface Module

D.1 Introduction

IR-IP is a high-performance miniature IP router based on RAD's unique IP router chip, the ChipRouter.

IR-IP works by taking each Ethernet frame from the LAN and determining whether the IP packet is destined for the IP net on the Ethernet LAN. If not, IR-IP forwards the packet to the WAN (E1) link. IP packets received from the WAN link are automatically forwarded to the LAN if the IP net matches.

IR-IP includes hardware filters which handle all filtering operations at wire speed from both LAN-to-WAN and WAN-to-LAN, without dropping a single packet.

Filtering and forwarding are performed at the maximum rate of 35,000 and 30,000 frames per second (wire speed), respectively. The buffer can hold 256 frames of maximum size of 1534 bytes and a throughput latency of one frame.

IR-IP is available with 10BaseT (UTP) interface and is fully IEEE 802.3/Ethernet V2 compliant. The IR-IP interface can also operate in full duplex Ethernet applications.

RIC-E1 equipped with IR-IP can be used as a Frame Relay Access Device (FRAD) with an integral IP router. RFC 1490 is supported for a single DLCI on the E1 link. Detection of the DLCI and the maintenance protocol is performed automatically. This allows the IR-IP to be used as the termination unit of IP services over Frame Relay at the customer premises, opposite a Frame Relay switch in the backbone.

Alternatively, Point-to-Point Protocol (PPP) can be run on the WAN link with automatic negotiation on power-up, as well as support for PAP and CHAP authentication. With this feature, the IR-IP can operate opposite any PPP compliant access server or backbone router.

IR-IP supports HDLC, which is especially important for broadcast and multicast applications where bandwidth overhead is critical.

IR-IP supports IP multicast at wire speed, making it suitable for any multicast environment including high speed downstream environments, such as satellite and xDSL. Users on the LAN who register with the IR-IP for an IP multicast group using the IGsMP protocol filter IP multicast packets at wire-speed.

Management and advanced configuration of the IR-IP module are performed via Telnet.

Application

Figure D-1 shows a typical application of the RIC-E1 interface converter equipped with the IR-IP module.

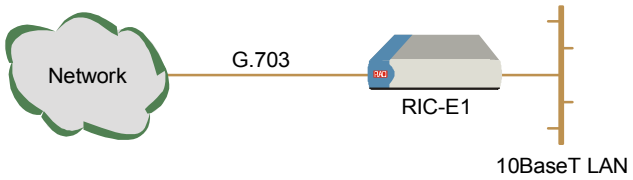


Figure D-1. Typical Application of RIC-E1 with IR-IP Module

D.2 Technical Specifications

Router	*LAN IP net*	Up to 256 hosts on LAN IP net
	Filtering and Forwarding	30 kbps / 35 kbps
	Buffer	256 frames (maximum size – 1534 bytes)
	Delay	1 frame
LAN	*Standard*	IEEE 802.3/Ethernet V2
	Data Rate	10 Mbps (20 Mbps 10BaseT in full duplex topology)
	Connector	10BaseT: Shielded RJ-45
WAN	*Protocols*	• PPP (PAP/CHAP) • Frame Relay (RFC 1490) • HDLC

D.3 Physical Description

Standalone RIC-E1

Figure D-2 shows the rear panel of RIC-E1 with the IR-IP module.

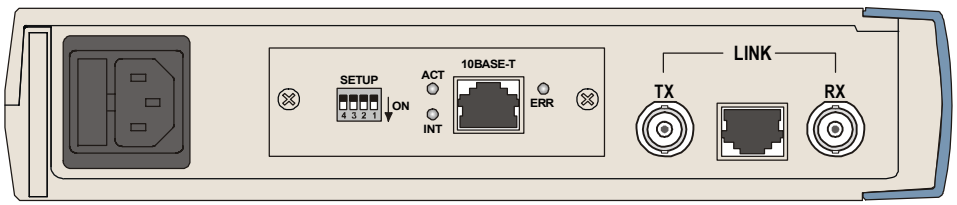


Figure D-2. Rear Panel of RIC-E1 with the IR-IP Module

RIC-E1/R Card

Figure D-3 illustrates the front panel of RIC-E1/R with IR-IP.

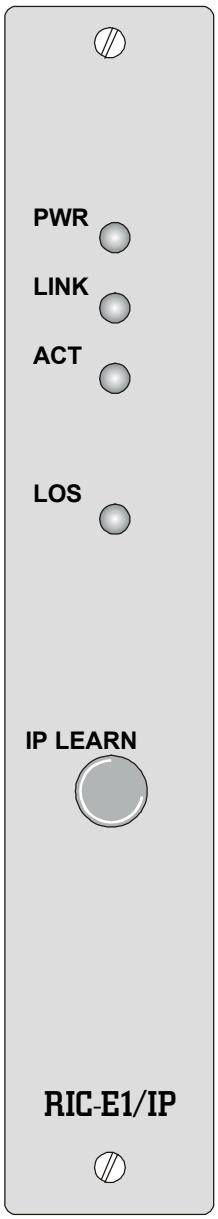


Figure D-3. RIC-E1/R with IR-IP

IR-IP LEDs

IR-IP contains LEDs, which indicate the module activity. *Table D-1* and *Table D-2* list the LEDs functions.

Table D-1. IR-IP LEDs Functions (Standalone RIC-E1)

LED	Color	Function
INT	Green	ON – LAN is connected
ACT	Yellow	Blinks – Transmit/receive activity is detected on the Ethernet link
ERR	Red	ON – Buffer overflow occurred (during regular operation) During power-up, provides additional indications, described below.

Table D-2. IR-IP LEDs Functions (RIC-E1/R Card)

LED	Color	Function
PWR	Green	ON – RIC-E1/R is powered up
LINK	Green	ON – LAN is connected
ACT	Yellow	Blinks – Transmit/receive activity is detected on the Ethernet link
LOS	Red	ON – No E1 data is received from the link

IR-IP Controls

IR-IP module contains a four-section DIP switch, as seen in *Figure D-4* and *Figure D-5*. *Table D-3* lists the DIP switch functions. In addition, RIC-E1/R contains the IP LEARN pushbutton, which is similar in its functionality to the section 1 of the IR-IP DIP switch.

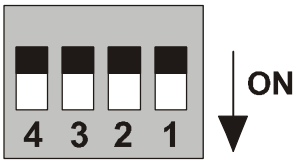


Figure D-4. IR-IP DIP Switch (Standalone Unit)

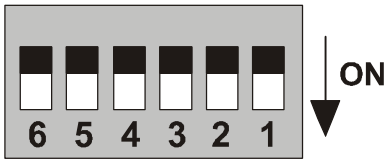


Figure D-5. IR-IP DIP Switch (RIC-E1/R Card)

Table D-3. IR-IP Controls

Control		Function	Values	Default Setting
RIC-E1	**RIC-E1/R**			
DIP switch, section 1	IP LEARN pushbutton, DIP switch, section 5	Enables IR-IP to learn its IP	**ON** – IP address learning is enabled **OFF** – IP address learning is disabled	OFF
***Note**: IP LEARN pushbutton settings override settings of the DIP switch.*				
DIP switch, section 2	DIP switch, section 4	Selects the WAN protocol	**ON** – PPP protocol **OFF** – Frame Relay protocol	OFF
DIP switch, section 3	DIP switch, section 3	Selects the LAN mode	**ON** – Full duplex operation **OFF** – Half duplex operation	OFF
DIP switch, section 4	DIP switch, section 2	Controls the remote WAN test loopback, which returns packets received from the WAN back toward the WAN	**ON** – The test loopback is activated **OFF** – The test loopback is disabled	OFF
–	DIP switch, section 6	Allows the user to operate the module in case the IP address and/or Telnet password are lost	**ON** – Forces default IP password and/or no password protection **OFF** – IR-IP operates according to user configuration	**OFF**
–	DIP switch, section 1	Not in use	–	–

Note *When using the IP LEARN pushbutton for the IP address configuration, make sure that the PNL SW jumper (JP5) on the RIC-E1/R PCB is set to EN.*

Table D-4 provides the pinout of the IR-IP RJ-45 connector.

Table D-4. RJ-45 Pinout

Pin	Name	Function
1	TD (+)	Transmit data positive
2	TD (-)	Transmit data negative
3	RD (+)	Receive data positive
6	RD (-)	Receive data negative

D.4 IR-IP Management Subsystem, General

The IR-IP interface module management subsystem supports the following functions:

- Preliminary configuration
- Configuration of management access parameters
- Advanced configuration of IR-IP parameters
- Collection and display of statistical performance data
- Maintenance functions, which include:
  - Software downloading

- Erasing user configuration
- Resetting of various subsystems
- Display of error log
- Ping utility, for checking IP connectivity.

The management subsystem of the IR-IP interface module is a separate, independent entity. The communication with the IR-IP management subsystem is made through the local LAN interface connector of the IR-IP module, designated 10BASE-T, using the Telnet protocol. Passwords can be used to prevent unauthorized access.

Accessing the IR-IP Management Subsystem

The IR-IP interface module must be configured in accordance with the specific requirements of the user's application before it can be used in the user's network. As a result, it is not possible to supply default parameters to enable IR-IP to start service without any preliminary configuration.

Therefore, to enable the user to establish Telnet communication and configure IR-IP, IR-IP is delivered with a factory-default set of parameters. The default parameters are automatically used:

- Before IR-IP is configured by the user, e.g., when a new RIC-E1 with IR-IP interface module is put into operation
- After the user's configuration parameters have been erased.

When the factory-default parameters are used, the ERR indicator located on the RIC-E1 rear panel, near the IR-IP Ethernet interface connector flashes rapidly (about three times per second). The flashing of the ERR indicator also serves as a warning to the user that the IR-IP WAN (E1) interface does not send, nor does it receive packets, and therefore IR-IP can be accessed only from the LAN.

After configuring IR-IP, it starts normal operation and routes the traffic in accordance with the user-selected configuration parameters.

To change the parameters of an already-configured IR-IP, establish communication from a Telnet host using the assigned IP address.

Default IP Communication Parameters

The factory-default IP communication parameters of the interface module are:

- The default IP address of the IR-IP Ethernet port is 192.168.205.1, and the default IP subnet mask is 255.255.255.252.
- The port will accept IP communication only from the IP address 192.168.205.2. Therefore, as long as the factory defaults are in effect, you must assign this address to the Telnet host used to configure IR-IP.

Using the IP learning mechanism, as explained below you can change the default parameters.

Rescue Configuration

In case you have forgotten the IP address or the Telnet password, you will generally not be able to view or modify the IR-IP configuration. The Rescue feature allows you to overcome this problem.

➤ **To allow the IR-IP configuration:**

1. Remove RIC-E1/R from the chassis.
2. Set section 6 of the DIP switch to ON.
3. Insert RIC-E1/R back into the chassis.

   As soon as RIC-E1/R is powered on, it will respond to the default IP address and permit entering configuration screens without password protection. All the other configuration parameters remain unchanged.
4. After setting the parameters to desired values, remove RIC-E1/R from the chassis and restore section 6 of the DIP switch to OFF.

D.5 Performing Preliminary Configuration

The software necessary for performing all the management and configuration functions is stored in the IR-IP interface module, and therefore you only need a regular Telnet host to perform all the activities described in this appendix.

A Telnet host is any computer, e.g., an IBM PC or compatible that fulfills the following minimum requirements:

- A standard 10BaseT Ethernet interface
- A TCP/IP protocol stack, and therefore is capable of supporting IP communication through the Ethernet interface
- Telnet client software
- A ping utility.

Outline of Preliminary Configuration

➤ **To perform the preliminary configuration procedure:**

1. Connect the Telnet host to the IR-IP interface module.
2. Configure the Telnet host to enable communication with the IR-IP interface module using the default IP parameters.
3. Establish communication with IR-IP and assign the prescribed IP address to its LAN interface.
4. Establish again communication with IR-IP and continue the preliminary configuration in accordance with the *Quick Setup Menu* section below.

Connecting the Telnet Host

Before starting the management and configuration activities, it is necessary to establish IP communication between your Telnet host and the IR-IP interface module. For this purpose, it is necessary to provide a communication path.

Because of the method used to assign an IP address to IR-IP Ethernet port, it is recommended to connect the Telnet host directly to the IP router 10BASE-T connector. This is made by connecting an Ethernet cross cable between the Ethernet connector of the Telnet host and the IP router connector.

However, you may also connect through a common LAN: in this case, connect your Telnet host and IR-IP to Ethernet hub ports using straight cables.

Preliminary Telnet Host Configuration

You can use the IP learning mechanism to configure the IP communication parameters of the IR-IP LAN interface. In this case, skip to the *Assigning the Router LAN Interface Address* section below.

If you prefer to use the factory-default parameters to establish IP communication between your Telnet host and IR-IP, configure the Telnet host as follows:

1. Temporarily configure the host IP address as 192.168.205.2.
2. The initial destination IP address to be used by the host is 192.168.205.1.

Note *The first step in the preliminary configuration process is to assign the desired IP address to the LAN interface of the IR-IP interface module.*
After an IP address is assigned and saved, you must change the destination IP address of the Telnet host to the new address, otherwise it is not possible to continue the configuration process. At the same time, you can also change the temporary IP address assigned to the host (192.168.205.2) back to its permanent address.

Assigning the Router LAN Interface Address

The IP address of the IR-IP LAN interface must be configured as part of the preliminary configuration process. To simplify this process, IR-IP includes a simple and convenient IP address learning mechanism.

The IP address can be configured and changed at any time, even after the complete IR-IP configuration process has been performed, because it does not affect other configuration parameters. Moreover, the IP subnet mask is automatically adapted to the new IP address.

IP Learning Mechanism

To simplify the configuration process, IR-IP has a special mechanism for configuring the IP address of its LAN interface. Setting section 1, called IP address learning, of the IR-IP DIP switch (*Figure D-4*) to ON enables this mechanism.
For RIC-E1/R the IP learning procedure is performed by pressing the IP LEARN pushbutton on the card panel.

The IP learning mechanism enables IR-IP to learn its LAN interface IP address by receiving frames sent by a ***ping*** utility to the prescribed LAN IP address.

Note *To use the IP learning mechanism, you do not need to know the current address of IR-IP LAN interface, but only the prescribed IP address.*

The IP address is actually retrieved from the ARP frames sent during pinging to locate the ***ping*** destination, not from the ***ping*** frames.

To ensure that the process is correctly performed, it is recommended to check the contents of the ARP table before starting the ***ping*** utility, to make sure that it does not contain the address to be assigned to the IP router LAN interface.

➤ **To view and edit the ARP table contents:**

If the Telnet host you are using runs under Microsoft Inc. Windows™ 95, 98 or NT, use the following procedure to view and edit the ARP table contents:

1. Display the table using the **`arp -a`** command.
2. If the table includes the intended IP address, remove it from the table using the **`arp -d`** command.

If for some reason the IP learning process does not succeed, before repeating it make sure to remove the IP address from the table.

Assigning a LAN IP Address to a New IR-IP

The following procedure enables you to configure the LAN IP address of a new IR-IP router, i.e., a router using the default parameters (see the *Accessing the IR-IP Management Subsystem* section above).

If RIC-E1 is already operating, skip Step 2 in the following procedure.

➤ **To configure the IP router LAN address:**

1. Make sure the preparations described above have been completed, including the configuration of the ***ping*** utility.
2. Turn RIC-E1 on and monitor the IP router indicators:
   - The INT (LINK for RIC-E1/R) indicator turns on
   - The ERR indicator lights steadily for approx. 15 seconds, and then starts flashing at a rapid rate (about three times per second).

     If the ERR indicator turns off, skip to the *What to Do If ...* section below.
3. Set section 1 of IR-IP DIP switch to ON or push the IP LEARN pushbutton on the RIC-E1/R panel.

   The ERR indicator starts flashing faster (approximately four times a second).
4. Send a ***ping*** to the new address to be used by IR-IP. A confirmation should be received after the third ***ping***: after the confirmation, the flashing will slow down to approximately twice a second.

   If your host does not begin to receive ***ping*** replies after three unsuccessful attempts, skip to the *What to Do If ...* section below.
5. Return section 1 of the IR-IP DIP switch to the OFF position or push IP LEARN again to return the button to its initial position.

   The ERR indicator must turn off.

At this stage, the communication with IR-IP router is lost, because its IP address has been changed. Therefore, you must reconfigure the destination IP address of the Telnet host. If you wish, you may also change the temporary IP address assigned to the host (192.168.205.2) back to its permanent address.

After changing the destination IP address of the Telnet host, it is recommended to turn RIC-E1 off for a few seconds and then back on, before continuing the configuration of the IP router in accordance with the *Quick Setup Menu* section below. At this time, in Step 2 the ERR indicator turns off after the 15-second interval.

Changing the LAN IP Address of a Configured IR-IP

The LAN IP address of an already-configured IR-IP can be changed while it operates, this means it is not necessary to turn RIC-E1 off before starting the configuration procedure. Note however that the IP traffic flow through IR-IP will be disrupted until the other stations in the IP network learn the new address.

To change the LAN IP address of an already-configured IR-IP, use the procedure described above for a new IR-IP with the following differences:

1. Configure the destination address of the ***ping*** utility to the new LAN interface IP address. It is not necessary to change the Telnet host source address.
2. When ready, set section 1 of the IR-IP DIP switch to ON or push the IP LEARN pushbutton on the RIC-E1/R panel.

   The ERR indicator starts flashing faster (approximately four times a second).
3. Perform Steps 4, 5 of the procedure used for a new IR-IP.

What to Do If ...

➤ **After RIC-E1 is turned on, the INT (LINK for RIC-E1/R) indicator does not light**

The IR-IP interface module does not receive power from the RIC-E1 power supply. Service is required.

➤ **After RIC-E1 is turned on, the ERR indicator does not light**

IR-IP is faulty and must be replaced.

➤ **After turn-on, the ERR indicator lights for 15 seconds and then turns off. ACT does not light, and there is no response from IR-IP**

No software loaded into IR-IP. Download software using the procedure described in the *New Software Download Menu* section below.

➤ **After turn-on, the ERR indicator lights for 15 seconds, and then turns off. ACT lights from time to time, but there is no response from IR-IP**

IR-IP has been configured. If you do not know the current IP address of the LAN interface, erase IR-IP router configuration using the procedure given in the *Erasing User's Configuration* section below.

➤ **No ping replies from IR-IP**

If your host does not begin to receive ***ping*** replies after three unsuccessful attempts, check the physical connection path between the Telnet host Ethernet interface and the IR-IP 10BASE-T connector.

➤ **The IP learning process is not successful**

Check that the prescribed IP address does not appear in the ARP table.

D.6 IR-IP Management Utility

General Operating Procedures

The IR-IP interface module is managed via a simple, menu-driven utility that uses a basic terminal user interface. A typical screen is shown in *Figure D-6*.

As seen in *Figure D-6*, each screen has a header that identifies the device being configured and its logical name, assigned by the user, followed by the running software revision and date. The bottom line of the screen displays prompts that guide you in the execution of the various activities.

Use the following general procedures to perform the desired activity:

- To change a parameter or to select a menu item, type the corresponding line number.
- For a parameter, which has a discrete set of values, the parameter values are enclosed in brackets [ ]. To select a new value, press the spacebar to scroll among the available values until the desired value is displayed, and then press <Enter> to select the displayed value.
- To enter a value which requires free text entry, type in the desired string and then press <Enter>. Use backspace to erase the current string.
- After all the parameters have been selected, a prompt appears, requesting that you confirm the changes.

Note *For proper display of the screens, you must:*

- *Select a fixed-pitch system font for the display. Use your operating system documentation to find how to select a proper font.*
- *Configure the Telnet utility to use VT-100 terminal emulation.*

Starting a Management Utility

The management utility is started automatically when Telnet communication is established. If password protection is enabled (see the *Management Access Menu* section below), you will be prompted to enter the Telnet password. The opening screen, which appears after the Telnet session activation, is the IR-IP Main menu (see *Figure D-6*).

```
IR_IP                        <IR-IP>                 S/W Ver. 1.21 31/IR (date)

1. Quick Setup
2. Management Access
3. Advanced Setup
4. Device Control
5. View
6. Diagnostic Tool (PING terminal)

Press one of the numbers to select or ESC:
```

Figure D-6. IR-IP Main Menu

To end the utility, press <Esc> when the Main menu is displayed. This will also end the Telnet session.

Menu Structure of Management Utility

Figure D-7 shows the menu structure of the IR-IP management utility.

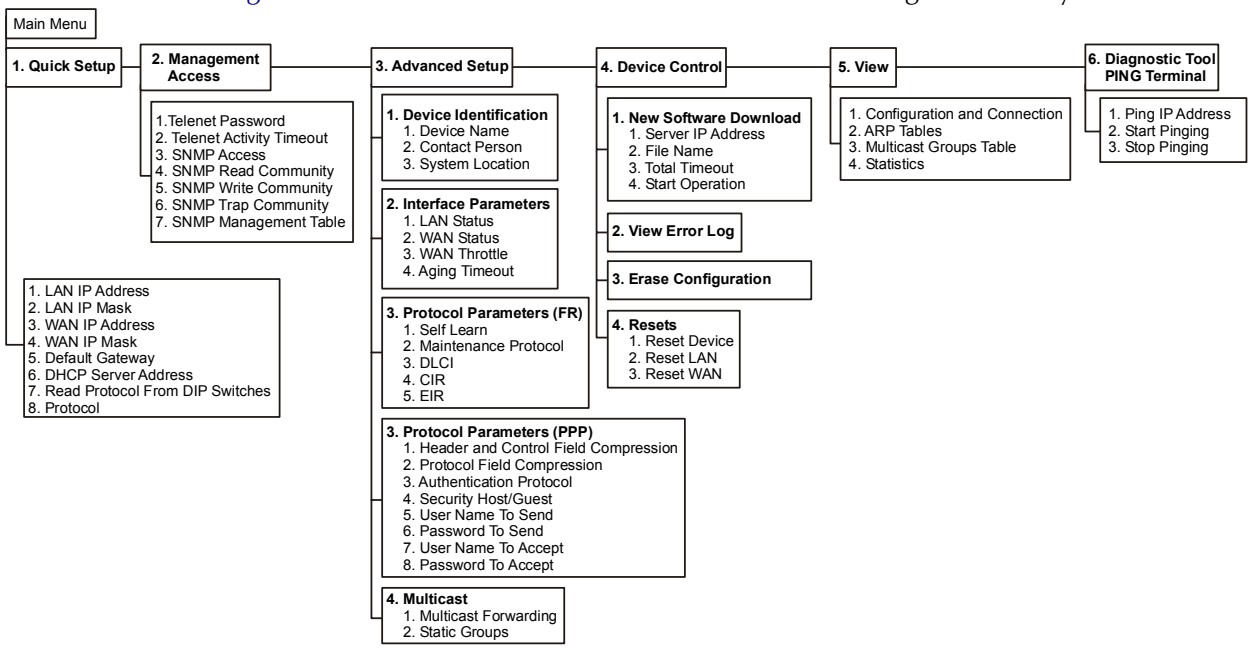


Figure D-7. Management Utility, Menu Structure

D.7 Quick Setup Menu

The Quick Setup menu is used to select the main parameters' values that must be defined before you start using IR-IP.

Use the Advanced Setup menu (see the *Advanced Setup Menu* section below) to specify values for other IR-IP configuration parameters not included in this menu.

➤ **To access the Quick Setup menu:**

- From the Main menu, type **1**.

The Quick Setup menu appears (*Figure D-8*).

```
IR_IP                          <IR-IP>              S/W Ver. 1.21 31/IR (date)
Quick Setup
=========================================================================
1. LAN IP Address                                      :192.168.100.001
2. LAN IP Mask                                         :255.255.255.000
3. WAN IP Address (empty for unnumbered)               :................
4. WAN IP Mask (empty for unnumbered)                  :................
5. Default Gateway (empty - WAN interface)             :................
6. DHCP Server IP Address (empty for relay disabled)   :................
7. Read Protocol From DIP Switches                     :[ Yes ]
8. Protocol                                            :[ Frame Relay ]

Press one of the numbers to select or ESC:
```

Figure D-8. Quick Setup Menu

LAN IP Address

Used to enter the IP address for the IP router LAN interface. This is the address to which nodes connected to the local LAN send packets addressed to the WAN.

LAN IP Mask

Used to enter the IP subnet mask. The IP router supports a maximum of 254 hosts on the LAN, therefore you must use Class C subnet masks. The basic subnet IP mask for Class C addresses, which supports the maximum possible number of hosts, 254, is 255.255.255.0. To help you understand the selection of IP subnet masks, *Figure D-9* provides a configuration example for a LAN with 6 nodes: the IP subnet mask for a 6-node IP network is 255.255.255.248.

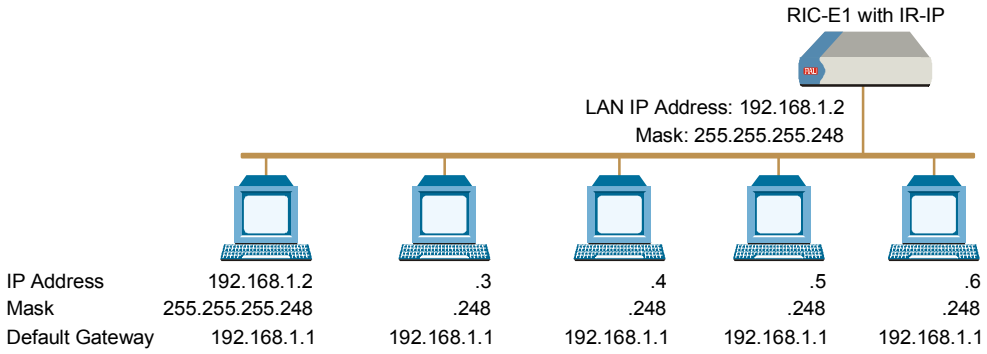


Figure D-9. Selecting the IP Subnet Mask

WAN IP Address

Used to enter the IP address for the IR-IP WAN interface, i.e., the IP address to be used by IP hosts on the WAN to reach this IR-IP interface module.

If the WAN IP Address field remain blank, IR-IP operates in the Unnumbered Router Mode.

WAN IP Mask

Used to enter the IP subnet mask for the WAN interface.

Default Gateway

Operation without Default Gateway

The IP interface module is intended to enable the extension of LANs through the RIC-E1 E1 link. Therefore, its default routing operation is different from the default routing operation of standard IP routers:

- IR-IP forwards packets with destinations not located on the local LAN through the WAN interface
- Packets received from the WAN interface and destined to hosts located on the local LAN are forwarded to the LAN; other packets are discarded.

The default operation is used when the Default Gateway field is blank.

Operation with Default Gateway

You can instruct IR-IP to send packets with destinations not located on the local LAN to a specific router, which is called the ***default gateway***. The default gateway must be connected to the local LAN.

To use this option, enter the IP address of another router attached to the local LAN in the Default Gateway field.

Note

It is very important to obtain the correct parameters from the system administrator or ISP. The most common problem when establishing an IP connection is incorrect configuration of IP parameters and default gateway. Do not try to guess these parameters.

DHCP Relay

IR-IP can operate as a DHCP relay for computers on its LAN. In this mode, the user does not need to configure the IP addresses and other related parameters for the PCs on the LAN: they receive the configuration from the DHCP server via the IR-IP module.

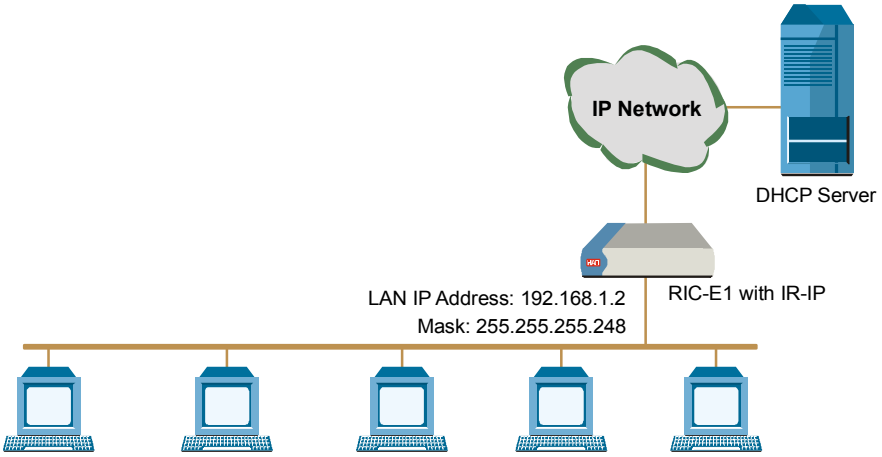


Figure D-10. DNCP Relay Operation

➤ **To configure the IR-IP as a DHCP relay:**

- From the Quick Setup menu, select **DHCP Server IP Address** and enter the IP address of the DHCP server.

Note

Leaving the DHCP Server IP Address field blank disables the DHCP relay.

Read Protocol from DIP Switches

Selecting YES for this parameter forces IR-IP router card to use the WAN protocol selected by section 2 of its DIP switch: PPP or Frame Relay.

If you want to be able to select the WAN protocol by means of the Protocol field (parameter 7) of the Quick Setup menu, select NO.

Protocol

Used to select the WAN protocol to be used by the IP router card: PPP, HDLC or Frame Relay.

This parameter is available only if the Read Protocol from DIP Switches parameter is set to NO.

D.8 Management Access Menu

The Management Access menu is used to enable the use of passwords to protect the access to IR-IP management utility, and control the inactivity time-out interval.

When password protection is enabled, a Telnet management session can start only after the correct password is entered.

➤ **To access the Management Access menu:**

- From the Main menu, type **2**.

The Management Access menu appears (*Figure D-11*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.21 31/IR (date)

Quick Setup
Management Access
=========================================================================
      1. Telnet Password                                :..........
      2. Telnet Inactivity Timeout (min)                :300..
      3. SNMP Access                                    :Disabled
      4. SNMP Read Community                            :public....
      5. SNMP Write Community                           :public....
      6. SNMP Trap Community                            :public....
      7. SNMP Management Table                          :>>>

Press one of the numbers to select or ESC:
```

Figure D-11. Management Access Menu

Note *Since the IP router card does not support SNMP management, the SNMP Read Community, SNMP Write Community, SNMP Trap Community, and SNMP Management Table parameters are not used.*

Telnet Password

By default, management access to IR-IP via Telnet is unrestricted. To restrict access, enter a Telnet password by selecting **1** in the Management Access menu. The password can include up to 10 characters, and is case-sensitive. The next time a Telnet session is opened, a password must be entered to enable you to access the IR-IP menus.

At any time, only one Telnet connection to IR-IP is permitted. Any attempt to open an additional connection while the current session is open is rejected.

Telnet Inactivity Timeout

This parameter specifies the time a Telnet session is kept open when there is no keyboard activity. When the specified time-out expires, the Telnet session is closed and another user can access IR-IP.

D.9 Advanced Setup Menu

The Advanced Setup menu is used to select the desired group of IR-IP configuration parameters.

The parameters accessed through Advanced Setup menu supplement the parameters available on the Quick Setup screen, by providing control over all the other IR-IP parameters.

➤ **To access the Advanced Setup menu:**

- From the Main menu, press **3**.

  The Advanced Setup menu appears (*Figure D-12*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.21 31/IR (date)

Quick Setup
Management Access
Advanced Setup
=============================================================================
     1. Device identification
     2. Interface Parameters
     3. Protocol Parameters
     4. Multicast IP

Press one of the numbers to select or ESC:
```

Figure D-12. Advanced Setup Menu

Device Identification Menu

The Device Identification menu is used to define and store in the IR-IP logistic information: the logical name of IR-IP, information on the contact person and device location.

➤ **To access the Device Identification menu:**

- From the Advanced Setup menu, type **1**.

  The Device Identification menu appears (*Figure D-13*).

```
IR_IP                      <IR-IP>              S/W Ver. 1.21 31/IR (date)

Quick Setup
Management Access
Advanced Setup
.....................................................................
     Device identification
=====================================================================
     1. Device Name                          :IR-IP..
     2. Contact Person                       :Name of contact Person
     3. System Location                      :The location of this device

Press one of the numbers to select or ESC:
```

Figure D-13. Device Identification Menu

Device Name

Select this parameter to assign an arbitrary name to IR-IP for identification by the system manager (up to eight characters). The assigned name is displayed in the screen header.

Contact Person

Select this parameter to enter the name of the person to be contacted with matters pertaining to this equipment unit.

System Location

Select this parameter to enter the physical location of the device.

Interface Parameters Menu

The Interface Parameters menu is used to control the operation of IR-IP interfaces.

➤ **To access the Interface Parameters menu:**

- From the Advanced Setup menu, type **2**.

The Interface Parameters menu appears (*Figure D-14*).

```
IR_IP                      <IR-IP>              S/W Ver. 1.21 31/IR (date)

Quick Setup
Management Access
Advanced Setup
.....................................................................
     Device identification
     Interface Parameters
=====================================================================
     1. LAN Status                                    :[ Open  ]
     2. WAN Status                                    :[ Open  ]
     3. WAN Throttle                                  :[ Full  ]
     4. Aging Timeout (min)                           :5.

Press one of the numbers to select or ESC:
```

Figure D-14. Interface Parameters Menu

LAN Status

Used to enable/disable the flow of packets through LAN interface:

- **Open** – the flow of packets is enabled.
- **Closed** – the flow of packets is disabled. As a result, IR-IP does not accept, nor sends packets to the LAN, but its WAN interface may still be active, and can interact with other IP hosts on the WAN.

WAN Status

Used to enable/disable the flow of packets through the WAN interface:

- **Open** – the flow of packets is enabled.
- **Closed** – the flow of packets through the WAN interface is disabled. As a result, IR-IP does not accept from, nor sends packets to the WAN. However, the LAN interface of the IP router is still active.

WAN Throttle

This parameter specifies the maximum data rate at which data is sent to the WAN (i.e., to the E1 link). Since RIC-E1 operates only in the unframed mode, the only relevant parameter for the WAN throttle is Full (2048 kbps).

Aging Timeout

Used to specify the time after which inactive LAN stations are removed from the IR-IP ARP table.

A station is defined as inactive when no IP traffic is received from it by the IR-IP LAN interface.

WAN Protocol Parameters – Frame Relay Protocol Menu

The Frame Relay Protocol Parameters menu is used to configure the parameters Frame Relay WAN for protocol (the WAN protocol is selected by means of the *Quick Setup Menu*) in *Figure D-8*.

➤ **To access the Protocol Parameters menu:**

- From the Advanced Setup menu, type **3**.

Self Learn

Used to specify whether the Frame Relay DLCI and maintenance protocol is learned automatically (ENABLED), or is manually entered (DISABLED).

Maintenance Protocol

When the Self Learn parameter is DISABLED, use this parameter to specify the desired maintenance protocol.

DLCI

When the Self Learn parameter is DISABLED, use this parameter to specify the DLCI used for exchanging maintenance protocol messages.

CIR

Used to specify the maximum amount of data, in bits, which the Frame Relay network guarantees to transfer during the measurement interval (the measurement interval is usually one second).

The value of this parameter is obtained from your Frame Relay service provider.

EIR

Used to specify the maximum amount of data, in bits, that the Frame Relay network will attempt to deliver during the measurement interval. The value of this parameter is obtained from the Frame Relay service provider.

A typical Frame Relay Protocol Parameters menu is shown in *Figure D-15*.

```
IR_IP                      <IR-IP>              S/W Ver. 1.21 31/IR (date)
Quick Setup
Management Access
Advanced Setup
.....................................................................
     Device identification
     Interface Parameters
     Protocol Parameters
=====================================================================
     1. Self Learn                                :[ Enabled  ]
     2. Maintenance Protocol                      :[ ANSI T1.617 ANNEX D ]
     3. DLCI (0-None)                             :0..
     4. CIR                                       :0.......
     5. EIR                                       :64000...
Press one of the numbers to select or ESC:
```

Figure D-15. Frame Relay Protocol Parameters Menu

WAN Protocol Parameters – PPP Protocol

The PPP Protocol Parameters menu is used to configure the parameters PPP WAN for protocol (the WAN protocol is selected by means of the (the WAN protocol is selected by means of the *Quick Setup Menu*) in *Figure D-8*.

➤ **To access the Protocol Parameters menu:**

- From the Advanced Setup menu, type **3**.

Header and Control Field Compression

Used to control the use of header and control field compression type according to RFC 1661. It is strongly recommended that this compression be used for troubleshooting only.

Protocol Field Compression

Used to control the use of protocol field compression type according to RFC 1661. It is strongly recommended that this compression be used for troubleshooting only.

Authentication Protocol

Used to select the authentication protocol used by an IP router configured as host to validate incoming connections.

Security Host/Guest

This option can be used to configure the IP router either as a guest unit, to be authenticated by another router, or as a host unit, that authenticates other routers.

User Name To Send

The name by which an IP router card configured as guest identifies itself.

Password To Send

The password by which an IP router card configured as guest identifies itself.

User Name To Accept

The user name to be accepted by an IP router configured as host, when an incoming connection request is received.

Password To Accept

The user password to be accepted by an IP router configured as host, when an incoming connection request is received.

A typical PPP Protocol Parameters menu is shown in *Figure D-16*.

```
IR_IP                        <IR-IP>              S/W Ver. 1.21 31/IR (date)

Quick Setup
Management Access
Advanced Setup
.....................................................................
     Device identification
     Interface Parameters
     Protocol Parameters
=====================================================================
     1. Header and Control Field Compression         :[ No  ]
     2. Protocol Field Compression:                  :[ No  ]
     3. Authentication Protocol                      :[ NONE/NONE  ]
     4. Security Host / Guest                        :[ Guest  ]
     5. User Name To Send                            :.................
     6. Password To Send                             :.................
     7. User Name To Accept                          :.................
     8. Password To Accept                           :.................

Press one of the numbers to select or ESC:
```

Figure D-16. PPP Protocol Parameters Menu

Multicast IP Menu

The Multicast IP menu is used to specify the IP multicast frame forwarding parameters, and to access the static multicast groups' table.

➤ **To access the Multicast IP menu:**

- From the Advanced Setup menu, press **4**.

  The Multicast IP menu appears (*Figure D-17*).

```
IR_IP                      <IR-IP>              S/W Ver. 1.21 31/IR (date)
Quick Setup
Management Access
Advanced Setup
.....................................................................
     Device identification
     Interface Parameters
     Protocol Parameters
     Multicast IP
=====================================================================
     1. Multicast forwarding                              :[ Disable ]
     2. Static groups                                    :>>>

Press one of the numbers to select or ESC:
```

Figure D-17. Multicast IP Menu

Multicast Forwarding

Used to control the forwarding of IP multicast frames. The following selections are available:

- **DISABLED** – Disables multicast forwarding in both directions.
- **LAN to WAN** – Enables forwarding of IP multicast frames addressed to groups appearing in the Static Multicast Groups table, from the LAN to the WAN.
- **WAN to LAN** – Enables forwarding of IP multicast frames addressed to groups appearing in the Static Multicast Groups table, from the WAN to the LAN.
- **BIDIRECTIONAL** – Enables forwarding of IP multicast frames addressed to groups appearing in the Static Multicast Groups table, in both directions.
- **WAN to LAN + IGMP** – Enables forwarding of IP multicast frames addressed to groups appearing in the Static Multicast Groups table, from the WAN to the LAN. In addition, more groups can be added dynamically (the additional can be viewed using the View menu – *Figure D-22*).
- **TRANSPARENT** – All the IP multicast frames are forwarded, irrespective of the Static Multicast Groups table.

Static Groups

Select this parameter to access the static multicast groups table. The table is used to specify the IP addresses for up to 10 IP multicast groups. To access the Static Groups menu:

- From the Multicast IP menu, type **2**.

The following screen appears:

```
IR_IP                      <IR-IP>              S/W Ver. 1.21 31/IR (date)
                       Static Multicast Groups Table
                       -----------------------------
   Group IP Address
1.  ...............
2.  ...............
3.  ...............
4.  ...............
5.  ...............
6.  ...............
7.  ...............
8.  ...............
9.  ...............
10. ...............

Press 'A'-add, 'E'-edit, 'D'-delete, 'C'-clear all, 'ESC'-exit:
```

Figure D-18. Static Multicast Groups Table

D.10 Device Control Menu

The Device Control menu is used to download software from TFTP servers and perform interface and device resets.

➤ **To access the Device Control menu:**

- From the Main menu, type **4**.

The Device Control menu appears (*Figure D-19*).

```
IR_IP                      <IR-IP>              S/W Ver. 1.21 31/IR (date)
Quick Setup
Management Access
Advanced Setup
Device Control
------------------------------------------------------------
     1. New Software Download
     2. View error LOG
     3. Erase Configuration
     4. Resets
Press one of the numbers to select or ESC:
```

Figure D-19. Device Control Menu

New Software Download Menu

IR-IP operates as a TFTP client, and therefore it is possible to update its software by downloading new software from another computer that operates as a TFTP server.

The New Software Download menu is used to specify the software downloading parameters.

➤ **To access the New Software Download menu:**

- From the Device Control submenu, type **1**.

  New Software Download menu appears (*Figure D-20*).

```
IR_IP                      <IR-IP>              S/W Ver. 1.21 31/IR (date)

Quick Setup
Management Access
Advanced Setup
Device Control
.....................................................................
     New Software Download
=====================================================================
     1. Server IP Address                              :..............
     2. File Name                                      :................
     3. Total Timeout (sec)                            :..
     4. Start operation                                :>>>
Press one of the numbers to select or ESC:
```

Figure D-20. New Software Download Menu

Server IP Address

Used to enter the IP address of the TFTP server.

File Name

Used to enter the name and path of the file to be transferred from the TFTP server.

Total Timeout

Used to enter the time IP router should wait for an acknowledgment from the TFTP server, for example 60 seconds.

Start Operation

After selecting all the necessary parameters, type **4** on the New Software Download screen and then press <Enter> to start the downloading.

You can follow the progress of the downloading process (indicated by arrows).

Upon completion of the download process, the unit performs a reset. The Telnet connection is lost and must be restarted if required.

Viewing Error Log Screen

This item of the Device Control submenu is used to view the error log file. This file logs errors detected in IR-IP for debug and technical support purposes.

Erasing Configuration

Selecting this item allows you to reset *all* the configuration parameters to their default values.

Note

- *Do this only if you need to reconfigure the module anew (all the parameters).*
- *After erase confirmation all connections with the IR-IP module will be lost. For instructions on further configuration, refer to Performing Preliminary Configuration on page D-7.*

Resets Menu

The Resets menu allows you to perform reset of IR-IP, or its interfaces.
This operation can be used to restore normal operation after service is disrupted by an abnormal condition. Any data stored in the IR-IP buffers is discarded, and the flow of traffic is temporarily interrupted.

➤ **To access the Resets menu:**

- From the Device Control menu, type **3**.

  The following screen appears:

```
IR_IP                      <IR-IP>              S/W Ver. 1.21 31/IR (date)

Quick Setup
Management Access
Advanced Setup
Device Control
.....................................................................
     New Software Download
     View error LOG
     Erase Configuration
     Resets
=====================================================================
     1. Reset Device
     2. Reset LAN
     3. Reset WAN
Press one of the numbers to select or ESC:
```

Figure D-21. Resets Menu

Resetting Device

➤ **To restart IR-IP:**

- From the Resets menu, type **1**.

  You will be prompted to confirm the reset operation.

Note *Resetting the device will restart the IR-IP interface module, and therefore traffic flow is temporarily interrupted, and the Telnet connection is lost.*

Resetting LAN

➤ **To reset the LAN interface:**

- From the Resets menu, type **2**.

  You will be prompted to confirm the reset operation.

Note *This operation restarts the IR-IP LAN controller.*
To continue your Telnet session, press any key within 15 seconds following the confirmation of the reset operation.

Resetting WAN

➤ **To reset the WAN interface:**

- From the Resets menu, type **3**.

  You will be prompted to confirm the reset operation.

Note *Resetting the WAN interface causes the WAN controller to be restarted. This results in renegotiation of the WAN protocol parameters.*
To continue your Telnet session, press any key within 15 seconds following the confirmation of the reset operation.

D.11 View Menu

The View menu is used to view the IR-IP configuration data, and display information on its ARP tables, multicast Groups tables and statistics.

➤ **To access the View menu:**

- From the Main menu, type **5**.

  The View menu appears (*Figure D-22*).

```
IR_IP                      <IR-IP>              S/W Ver. 1.21 31/IR (date)

Quick Setup
Management Access
Advanced Setup
Device Control
View
------------------------------------------------------------
     1. Configuration and Connection
     2. ARP Tables
     3. Multicast Groups Table
     4. Statistics
Press one of the numbers to select or ESC:
```

Figure D-22. View Menu

Configuration and Connection

This screen is used to view the configuration parameters of IR-IP. In addition, you can also view the current status of the LAN and WAN interface.

➤ **To access the Configuration and Connection screen:**

- From the View menu, type **1**.

  The View Configuration screen appears (*Figure D-23*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.21 31/IR (date)

                              VIEW CONFIGURATION
                              ------------------
BOOT Version        :X.XX  XX.XX.XXXX
Device Name         :IP router card
System Location     :The location of this device
Contact Person      :Name of contact Person

MAC Address         : 00-20-D2-XX-XX-XX
Default Gateway     : WAN

Intrf Type   Baud(Kbps)  Prot   IP Address        IP Mask           Status
.....................................................................
LAN   UTP    -------     Ethr   192.168.205.005   255.255.255.000   Connected
WAN   V.110              FR                                        Not Conn.

Press any key to continue:
```

Figure D-23. View Configuration Screen

ARP Tables

This screen is used to display the IR-IP ARP table. This table shows the IP address assigned to each station on the LAN (the stations are identified by their MAC addresses).

➤ **To access the ARP Tables screen:**

- From the View menu, type **2**.

The ARP Tables screen appears (*Figure D-24*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.21 31/IR (date)


                                  ARP Table
                                  ---------
    IP Address          MAC Address          IP Address    MAC Address
    192.168.205.003     00-40-33-20-C8-3C

Press any key for exit
```

Figure D-24. ARP Tables Screen

Multicast Groups Table Screen

This screen is used to display information about the multicast group IP addresses and their status.

➤ **To access the Multicast Groups Table screen:**

- In the View menu, type **3**.

The Multicast Groups Table screen appears (*Figure D-25*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.21 31/IR (date)


Multicast Groups Table
----------------------

     Group IP Address Status           Group IP Address Status

Press any key for exit
```

Figure D-25. Multicast Groups Table Screen

Statistics Screen

The Statistics screen is used to display statistical information on the traffic between the networks connected by IR-IP. The data displayed on this screen enables you to evaluate the IR-IP performance. Two different Statistics screens are used, one for the LAN side and the other for the WAN side.

➤ **To access the Statistics menu:**

- In the View menu, type **4**.

The LAN and WAN Statistics screens appear (*Figure D-26* and *Figure D-27*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.21 31/IR (date)

                              SYSTEM STATISTICS
                              -----------------
     Counter Name                Val     Counter Name                 Val
LAN in Octets                   83504    LAN IP Header Errors          0
LAN Unicast Frames In               1    LAN IP Address Errors         0
LAN Non-Unicast Frames In           9    LAN Alignment Errors          0
LAN Out Octets                  83504    LAN CRC Errors                0
LAN Unicast Frames Out           3560    LAN Single Collisions         0
LAN Non-Unicast Frames Out          0    LAN Multiple Collisions       0
LAN to WAN Frames Passed         1698    LAN Late Collisions           0
LAN IP Datagram Received         2638    LAN Excessive Collisions      0
LAN to CPU Frames Discarded         0    LAN Frames Too Long Errors    0
LAN to WAN Frames Discarded         0    LAN RX FIFO Overrun Error     0
LAN Out Errors                      0    LAN SQE Transmitted           0
LAN RX Frames Errors                0    LAN Deferred Frames           1
LAN MAC Receive Errors              0    LAN Carrier Sense Lost        0
LAN MAC TX Errors                   0    LAN FIFO Underrun             0

     N - Next Screen. ESC - Back To Previous Menu.
     R - Refresh Page. C - Clear The Counters Of This Page.
```

Figure D-26. LAN Statistics Screen

```
IR_IP                      <IR-IP>              S/W Ver. 1.21 31/IR (date)

                             SYSTEM STATISTICS
                             -----------------
     Counter Name               Val     Counter Name               Val
WAN in Octets                 83504    WAN Alignment Errors       0
WAN Out Octets                 1950    WAN Aborted Frames         0
WAN Out Frames                 1723    WAN Short Frames           0
WAN to LAN Frames Transfer     1698    WAN RX FIFO Overrun Error  0
WAN IP Datagram Received       1723    WAN to CPU Frames Errors   0
WAN to CPU Discarded              0    WAN Frame Too Long Errors  0
WAN to LAN Discarded              0    WAN IP Header Errors       0
WAN Out Errors                    0    WAN IP Addres Errors       0
WAN CRC Errors                    0

PPP Address Error                 0
PPP Control Error                 0
DLCI Unrecognized Error           0
Frame Relay Forward Conge         0
Frame Relay Backward Conge        0

     P - Previous Screen. ESC - Back To Previous Menu.
     R - Refresh Page. C - Clear The Counters Of This Page.
```

Figure D-27. WAN Statistics Screen

D.12 Diagnostic Tool (Ping Terminal) Menu

This section provides information on the diagnostic tool provided with IR-IP.

➤ **To access the Diagnostic Tools menu:**

- In the Main menu, type **6**.

  The Diagnostic Tools menu appears (*Figure D-28*).

```
IR_IP                      <IR-IP>              S/W Ver. 1.21 31/IR (date)

Quick Setup
Management Access
Advanced Setup
Device Control
View
Diagnostic Tools (PING terminal)
=====================================================================
     1. Ping IP Address                          :192.168.100.011
     2. Start Pinging                            :>>>
     3. Stop Pinging                             :>>>

Press one of the numbers to select or ESC:
```

Figure D-28. Diagnostic Tools Menu

Using the Ping Function

The Ping option is used to confirm IP connectivity by ***pinging*** other IP hosts. Connectivity is confirmed by receiving a reply from the remote (pinged) IP host.

➤ **To ping a host:**

1. From the Diagnostic Tools menu, type **1** and enter the desired host IP address.
2. Press <Enter> to confirm the destination IP address.
3. To start pinging, type **2** on the Diagnostic Tools screen.

   After pinging starts, you can monitor the ***ping*** status. A typical screen is shown in *Figure D-29*.

Note *After pinging is started, it continues in the background even if you exit the Diagnostics Tools screen. In this case, a Ping Running message appears in the top upper left-hand corner of the screen.*

4. To stop pinging, type **3** from the Diagnostic Tools menu.

   A **Ping Stopped** message is displayed.
   To clear the message and return to the Diagnostic Tools screen, press any key.

```
IR_IP                        <IR-IP>              S/W Ver. 1.21 31/IR (date)

Quick Setup
Management Access
Advanced Setup
Device Control
View
Diagnostic Tools (PING terminal)
=================================================================
     1. Ping IP Address                                  :192.168.100.011
     2. Start Pinging                                    :>>>
     3. Stop Pinging                                     :>>>

Pinging 192.168.212.001 Sent 27 Recvd 25  Lost 2  Resp.Time 60 ms

Press one of the numbers to select or ESC:
```

Figure D-29. Diagnostic Tools Menu after Receiving Pinging Response

D.13 Erasing User's Configuration

The user-defined configuration parameters are stored in the IP router card flash memory. After the user-defined configuration parameters are erased, the IP router card automatically loads the factory-default parameters.

You may want to erase the current configuration parameters:

1. Before IR-IP is prepared for operation in a new application.
2. When you cannot configure IR-IP because its current LAN-interface IP address and/or the Telnet password, are not known.

➤ **To erase the user's configuration:**

1. Turn RIC-E1 off.
2. Set all the four sections of the IR-IP DIP switch (*Figure D-4*) to ON.
3. Turn RIC-E1 on and monitor the ERR indicator: it must turn on and start blinking.
4. While the ERR indicator is blinking (within 15 seconds), set sections 1 and 2 of the DIP switch to OFF.

   When the ERR indicator stops blinking and lights steadily, the IP router configuration becomes erased.

Note

If you do not set sections 1 and 2 to OFF within 15 seconds of power-up, the IP router card ignores the setting of all the four sections to ON and starts normal operation. In this case, it is recommended to turn the RIC-E1 off and then back on. To abort the whole operation, turn RIC-E1 off, return all the four-switch section to the desired positions, and then turn the RIC-E1 on again.

5. Turn RIC-E1 off, and the return all the four sections of the DIP switch to the desired positions.

D.14 Erasing IR-IP Software

You may erase the IR-IP application software, without erasing the user-defined parameters.

After the application software is erased, IR-IP starts its TFTP server application, and waits for the downloading of software by a TFTP client connected to its LAN interface. The procedure to be used to download the application software in this case is also described below.

You may want to erase the application software if the downloading of new software using the Device Control menu (see *Figure D-19*) fails, and the IP router card does not function properly.

Erasing Application Software

➤ **To erase the application software:**

1. Turn RIC-E1 off.
2. Set all the four sections of IR-IP DIP switch to ON.
3. Turn RIC-E1 on and monitor the IP router ERR indicator: it must turn on and start blinking.
4. While the ERR indicator is blinking (within 15 seconds), set sections 3 and 4 of the DIP switch to OFF.

   When the ERR indicator stops blinking and lights steadily, the IP router configuration becomes erased.

Note

If you do not set sections 3 and 4 to OFF within 15 seconds of power-up, IR-IP ignores the setting of all the four sections to ON and starts normal operation. In this case, it is recommended to turn RIC-E1 off and then back on.
Alternately, to abort the whole operation, turn RIC-E1 off, return all the four switches to the desired positions, and then turn RIC-E1 on again.

5. Turn RIC-E1 off, and the return all the four sections of the DIP switch to the desired positions.

Downloading New Software

After erasing the application software, you can download new software from any computer that can serve as a TFTP client.

To enable the downloading, IR-IP automatically activates its TFTP server application with the following factory-default IP parameters:

- IP address: 192.168.205.1
- Subnet mask: 255.255.255.252.

Connect the computer serving as a TFTP client to the IR-IP 10BASE-T connector in the way as a Telnet host used for preliminary configuration (see the *Performing Preliminary Configuration* section). The computer IP parameters must be configured as follows:

- IP address 192.168.205.2
- Subnet mask 255.255.255.252
- Default gateway 192.168.205.1

➤ **To download new software:**

1. If necessary, turn RIC-E1 off.
2. Set all the four sections of the IR-IP DIP switch to OFF.
3. Turn RIC-E1 on and monitor the ERR indicator: it must start flashing.
4. Connect the computer to the IP router LAN interface and configure its IP parameters as explained above.
5. Run a standard TFTP client application on the Telnet host, and download the appropriate software file.

   If the download is successful, IR-IP starts using the new software.

   If the downloading fails, repeat the download process.

Appendix E
IR-X.21B Interface Module

E.1 Introduction

IR-X.21B is an interface module for the standalone RIC-E1 units, converting X.21 signals to TTL levels.

Application

Figure E-1 shows a typical application of RIC-E1 with IR-X.21B interface module.

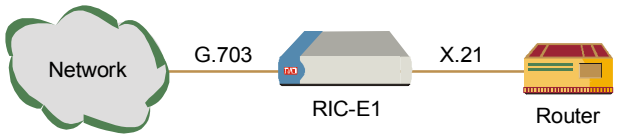


Figure E-1. Typical Application of RIC-E1 with IR-X.21B Module

Rear Panel

Figure E-2 shows the rear panel of RIC-E1 equipped with the IR-X.21B interface module.

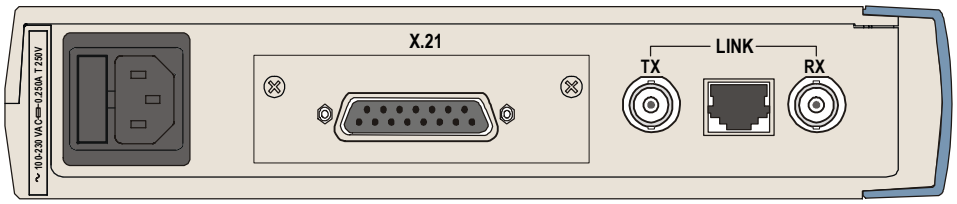


Figure E-2. Rear Panel of RIC-E1 with IR-X.21B Module

E.2 Selecting the IR-X.21B Timing

IR-X.21B interface module supports two clock modes:

- EXT (external)
- INT/LBT (internal/receive).

You must set the IR-X.21B clock to match the timing you have selected for RIC-E1. The clock settings are made via the JP2 jumper located on the IR-X.21B board, as shown in *Figure E-3*.

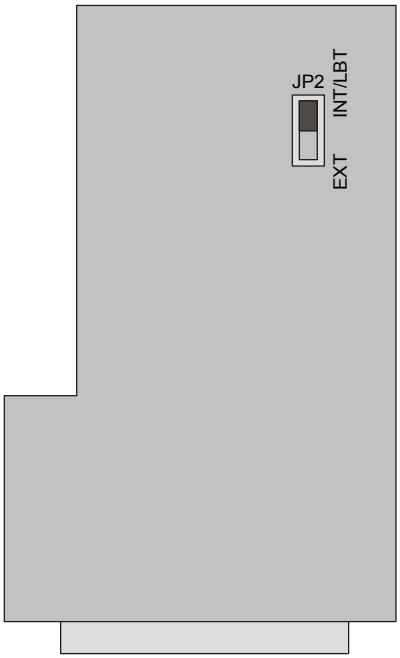


Figure E-3. IR-X.21B Module Layout

EXT Clock Mode

The EXT clock mode is used in applications of X.21 networks where the system timing is provided by the X.21 network. The IR-X.21B module has an internal 16-bit FIFO buffer to compensate for the phase delay introduced to the system by the line delay between the two units. *Figure E-4* illustrates the buffer connection and the flow of the receive, transmit and clock signals.

When RIC-E1operates in the external clock, you must set the IR-X.21B JP2 jumper to EXT.

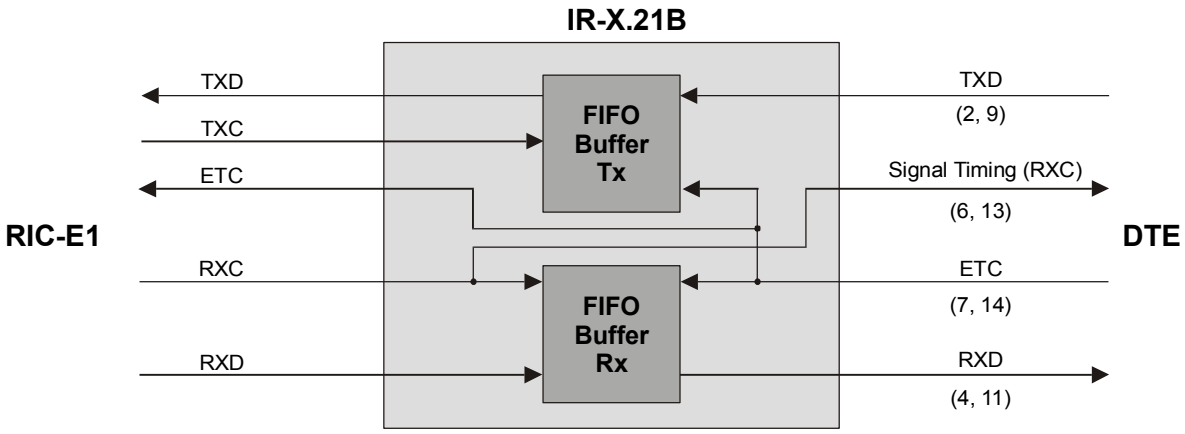


Figure E-4. EXT Timing Mode

INT/LBT Clock Mode

The INT/LBT clock mode is used in applications where the IR-X.21B side uses the clock signal from the E1 link. This mode is used mainly when the attached equipment has an X.21 interface, but no ability to produce clock signals. The module has a 16-bit FIFO buffer to compensate for the phase delay introduced by the X.21 device. *Figure E-5* illustrates the buffer connection and the flow of the receive, transmit and clock signals.

When RIC-E1 operates in the internal or receive clock, you must set the IR-X.21B JP2 jumper to INT/RCV.

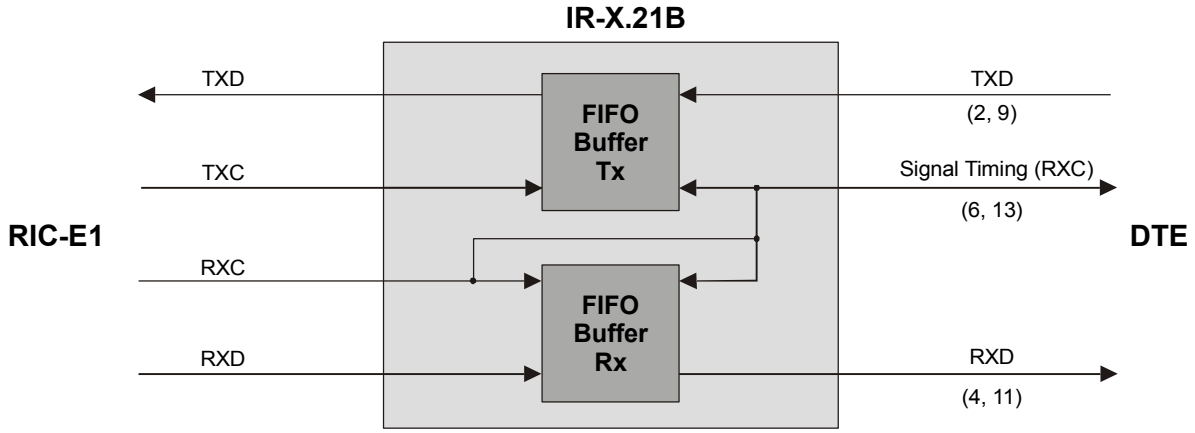


Figure E-5. INT/LBT Timing Mode

RAD data communications
24 Raoul Wallenberg St., Tel Aviv 69719, Israel
Tel: +972-3-6458181, Fax: +972-3-6483331, +972-3-6498250
E-mail: erika_y@rad.com, Web site: http://www.rad.com

Customer Response Form

RAD Data Communications would like your help in improving its product documentation. Please complete and return this form by mail or by fax or send us an e-mail with your comments.

Thank you for your assistance!

Manual Name: RIC-E1

Publication Number: 269-200-09/03

Please grade the manual according to the following factors:

	Excellent	*Good*	*Fair*	*Poor*	*Very Poor*
Installation instructions	❒	❒	❒	❒	❒
Operating instructions	❒	❒	❒	❒	❒
Manual organization	❒	❒	❒	❒	❒
Illustrations	❒	❒	❒	❒	❒
The manual as a whole	❒	❒	❒	❒	❒

What did you like about the manual?

_____

_____

_____

_____

_____

Error Report

Type of Error(s) or Problem(s):

- ❒ Incompatibility with product
- ❒ Difficulty in understanding text
- ❒ Regulatory information (Safety, Compliance, Warnings, etc.)
- ❒ Difficulty in finding needed information
- ❒ Missing information
- ❒ Illogical flow of information
- ❒ Style (spelling, grammar, references, etc.)
- ❒ Appearance
- ❒ Other _____

Please list the exact page numbers with the error(s), detail the errors you found (information missing, unclear or inadequately explained, etc.) and attach the page to your fax, if necessary.

_____

_____

_____

_____

Please add any comments or suggestions you may have.

_____

_____

_____

You are:

- ❒ Distributor
- ❒ End user
- ❒ VAR
- ❒ Other _____

Who is your distributor? _____

Your name and company: _____

Job title: _____

Address: _____

Direct telephone number and extension: _____

Fax number: _____

E-mail: _____

www.rad.com

INTERNATIONAL HEADQUARTERS:

24 Raoul Wallenberg Street, Tel Aviv 69719, Israel, Tel: 972-3-6458181
Fax: 972-3-6498250, 972-3-6474436, Email: market@rad.com

U.S. HEADQUARTERS:

900 Corporate Drive, Mahwah, N.J. 07430, Tel: (201) 529-1100
Toll Free: 1-800-444-7234, Fax: (201) 529-5777, Email: market@radusa.com

Publication No. 269-200-09/03